OUTLINES OF PSYCHOLOGY.

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OUTLINES OF PSYCHOLOGY

WITH SPECIAL REFERENCE TO

THE THEORY OF EDUCATION.

BY

JAMES SULLY, M.A.,

EXAMINER FOR THE MORAL SCIENCES TRIPOS IN THE UNIVERSITY OF CAMBRIDGE;
EXAMINER IN PHILOSOPHY IN THE VICTORIA UNIVERSITY; LATE EXAMINER
IN MENTAL AND MORAL SCIENCE IN THE UNIVERSITY OF
LONDON; AUTHOR OF "SENSATION AND
INTUITION," ETC.

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PREFACE.

In this volume an attempt is made to present the leading facts and truths of psychology, or the science of mind. I abide by the old conception that psychology is distinctly marked off from the physical or natural sciences as the chief of the moral sciences, having to do with the phenomena of the inner world, and employing its own method or instrument, namely, introspection. I conceive, further, that as a science of mind it stands in a peculiar relation to philosophical or metaphysical problems, such as the nature and limits of knowledge, and the nature of moral responsibility.

At the same time I hold that psychology, while a science of *mind*, is a *science* of mind. By this I mean, first of all, that it deals with events or processes which agree with the phenomena of the external world in exhibiting orderliness or uniformity of succession, and so are susceptible of being brought under definite laws; and, secondly, that it has in its own instruments and methods of research, when properly understood, an adequate means of ascertaining these laws

This conception of psychology is opposed, on the one hand, to the doctrine that the inner region of mind is (in part at least) not a realm of natural events having a fixed order. On the other hand, it stands in no less distinct antagonism to the view of Comte and his followers that introspection is incapable of being employed as a scientific instrument, and that therefore the facts of mind can only be studied as a special group of biological phenomena.

While thus following the traditional lead in claiming for psychology a place apart from the physical sciences, as the fundamental moral science, I follow the modern tendency to supplement the properly psychological study of mind by the physiological study of its nervous conditions and concomitants. Such investigation, though it cannot be a substitute for the direct observation of mental phenomena, seems to me to be a valuable addition to the science of mind, more particularly in its simpler departments (theory of sensation, &c.).

I hold with Lewes that since in psychology we are specially concerned with that type of mental development which presents itself in members of civilised communities, we must give prominence to the educative influence of that elaborate social system, involving the structure of language, traditional forms of thought, &c., with which each individual comes from the first into intimate contact.

Though conceiving the aim of psychology to be to study the processes taking place in the individual life, I deem it necessary to refer to that wider genetic conception of mind which regards the growth of the individual mind as a result of the past experience of the race, not only working indirectly through the external products, language, traditional knowledge, customs, &c., which constitute the social environment, but more directly through inherited aptitudes and dispositions.

I have endeavoured to make the manner of exposition as popular in character as is compatible with a properly scientific treatment of the most intricate of all groups of phenomena. To this end I have dwelt at some length on what may be called the embryology of mind, namely, the earlier and simpler forms of the several types of mental process in child-life. And I have further added to the general theory of mind brief references to the more familiar individual varieties.

In order to lighten the labour for the general reader, and at the same time to aid those who aim at a more advanced study of the subject, I have relegated a considerable amount of matter to special sections easily distinguishable by their type. These touch on more difficult questions of psychological analysis, on physiological points, and on the properly philosophical problems which are related to the special psychological subjects discussed in the text. I have further tried to meet the wants of the more special class of students by giving copious references to other works.

With the view of aiding the beginner, I have supplied a number of definitions of the less familiar and technical terms employed. And since psychology, in taking up the language of common life, needs to clear this of ambiguity and render it precise, I have sought to assign a definite meaning to many familiar words as employed in this work. The only scientific knowledge presupposed in this volume is an elementary acquaintance with the structure and functions of the nervous system, a knowledge which can now be easily obtained from such a work as Professor Huxley's *Elementary Lessons in Physiology.*

Finally, I have sought to give a practical turn to the exposition by bringing out the bearings of the subject on the conduct and cultivation of the mind. With this object I have ventured to encroach here and there on the territory of logic, æsthetics and ethics, that is to say, the practical sciences which aim at the regulation of the mental processes. Further, I have added special sections in a separate type dealing with the bearing of the science on Education.

I would fain think that these practical applications will not be without interest to all classes of readers; for everybody is at least called on to educate his own mind, and most people have something to do with educating the minds of others as well. With respect more especially to professional teachers, I trust that these portions of my volume may serve to establish the proposition that mental science is capable of supplying those truths which are needed for an intelligent and reflective carrying out of educational work. I may perhaps assume that modern pædagogics has adopted the idea that education is concerned not simply with instruction or communicating knowledge but with the training of faculty. And it seems a necessary corollary from this enlarged view of education that it should directly connect itself with the science which examines into the faculties, determines the manner and the conditions of their working, and lastly traces the order of their development.

If a teacher approaches the study of mental science with the supposition that it is going to open up to him a short and easy road to his professional goal, he will be disappointed. Such an expectation would show that his mind had not clearly seized the relation between science and art, theoretic and practical science. No theory of the processes involved in doing things, whether curing bodies, educating minds, or anything else, can be built up wholly out of the truths of science. The first condition of such a theory is a mass of traditional knowledge gained by experience or trial and observation. This "empirical" knowledge is all that the practitioner (physician, teacher, &c.) has in the early stages of his art. And with respect to the practical details of the art it must always continue to be the main source of guidance. The best method of bandaging a limb, and the best way to teach Latin are largely matters to be determined by experience.

The function of scientific truths in relation to art or practice is briefly to give us a deeper insight into the nature of our work and the conditions under which it is necessarily carried on. Thus mental science enlarges the teacher's notion of education by showing him what a complex thing a human mind is, in how many ways it may grow, how many influences must combine for its full exercise, and how variously determined is its growth by individual nature. It further furnishes him with wide principles or maxims, which, though of less immediate practical value than the narrower rules gained by experience, are a necessary supplement to these. By connecting the empirical rule with one of these scientific principles he is in a position to understand it, to know why it succeeds in certain cases and why it fails in others.

But science does more than this. It helps us to correct and improve our empirical rules. Just as there is a rational way of putting on a bandage which the scientific man who understands the process of healing will (other things being equal) more readily perceive than another, so there is a scientific way of teaching the alphabet or arithmetic, which a trained psychologist is in a better way to detect than another. A teacher who has thoroughly assimilated the leading truths of mental science may be aided by these to some extent even in the smallest details of school management.

While contending that a study of the development of the human mind in all its phases is of some value to the teacher, I do not mean that all parts of psychology are of equal value. Thus I am prepared to hear that teachers will find the chapters on Sensation and Perception of less practical interest than those say on Attention or Memory. It need hardly be observed, perhaps, that in using a work designed for students generally the teacher is expected either to exercise a certain degree of individual judgment, or to read under the guidance of a teacher of the subject.

The ample references to the works of other authors made in the course of the volume exonerate me from the duty of formally acknowledging my indebtedness to my predecessors. My one agreeable obligation is to tender my hearty thanks to Mr. Carveth Read for his friendly services (rendered under great press of work) in reading through the proofs of my volume. To him I owe many improvements, both in the matter and in the manner of the exposition.

HAMPSTEAD, *February, 1884.*

PREFACE TO SECOND EDITION.

THE speedy demand for a Second Edition has made it impossible for me to make any extensive alterations. The main improvements which I have been able to carry out consist of numerous additions to the references to the more recent authorities on the subject.

HAMPSTEAD, *November, 1884.*

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CHAPTER I.

INTRODUCTORY.

SCOPE AND METHOD OF PSYCHOLOGY.

PSYCHOLOGY or Mental Science is our general knowledge of Mind reduced to an accurate and systematic form. In order to understand this definition we must look for a moment into the meaning of the word Mind.

What is meant by Mind. We familiarly talk about minds. All men have minds, and many of the lower animals are commonly supposed to have them. Human minds are, however, those which are of chief interest here.

We distinguish between a mind as a unity, or a substance, and the several phenomena or states of this mind. What mind is in itself as a substance is a question that lies outside psychology, and belongs to philosophy. As a science psychology is concerned only with the phenomena of mind, with mental states, psychical facts, or whatever else we choose to call them.

The question as to the substance of mind is a philosophical or metaphysical one, and the solution of it does not seem necessary to psychology. It can be left over till the phenomena of mind are studied. It may, however, be said that some idea of mind as a unity, which holds together and combines the several states which we call psychical phenomena, is a necessary assumption or presupposition in psychology. Popular psychology clearly implies this idea. We speak of the mind as thinking, feeling, and so forth. And it may be said that the language of scientific psychology, such as 'state of mind,' 'mental activity,' and so on, necessarily implies this idea. Psychology may then take up and adopt this idea of a phenomenal or 'empirical,' as distinguished by Kant from a noumenal or 'intelligible' mind, self, or Ego. That is to say, we may assume the existence of minds in some sense or another, leaving it to philosophy to explain what exactly is implied in this assumption. On the need of some such assumption see Lotze, *Metaphysic*, Bk. III., Chap. I.; Volkmann, *Lehrbuch der Psychologie*, § 10. Compare Wundt, *Physiologische Psychologie*, 24es Cap., § 1.

How, now, shall we mark off these psychical facts from other phenomena? We cannot define such phenomena by resolving them into something simpler. They have nothing in common beyond the fact of being mental states. Hence we can only use some equivalent phrase, as when we say that a mental phenomenon is a part of our conscious life, or a state of our consciousness.[1] Or again we may enumerate the chief varieties of these mental phenomena and say that mind is the sum of our processes of knowing, our feelings of pleasure and pain, and our voluntary doings. Popularly, mind is apt to be identified with knowing or intelligence. A man of mind is a man of intellect. But though intelligence is perhaps the most important part of mind it is not the whole. In

[1] This is a rough popular way of speaking. The question whether there are any mental phenomena which are unconscious, that is, which do not enter into our conscious life or experience, is a subtle and much-disputed point in psychology.

mental science we must reckon the pain of a bruise as a fact of mind. Or finally we may set mind in antithesis to what is not mind. Mind is non-material, has no existence in space as material bodies have. We cannot touch a thought or a feeling, and one feeling does not lie outside of another in space. These phenomena occur in time only. Mind is thus the inner smaller world (mikrokosm) as distinguished from the external and larger world (makrokosm).

Mind and Body. While it is important thus to set mind in strong opposition to material things, we must keep in view the close connection between the two. What we call a human being is made up of a bodily organism and a mind. Our personality or 'self' is a mind connected with or embodied in a material framework. More particularly all mental processes or operations are connected with actions of the nervous system. The most abstract thought is accompanied by some mode of activity in the brain-centres. Hence while we must be careful not to confuse the mental and the material, the psychical and the physical, as though they were of the same kind (homogeneous), we cannot exclude the latter from view in dealing with mind. We must always think of mind as attended by, and in some inexplicable way, related to, the living organism, and more particularly the nervous system and its actions.

The relation of Mind to Body has given rise to much discussion in philosophy. The two are plainly connected in time. All science goes to show that psychical activity is uniformly accompanied by physical (nervous) activity. Again, there seems to be an interaction between the two. In certain cases nervous changes (*e.g.*, the propagation of an excitation from the eye to the brain) precede and appear to determine mental phenomena (sensations of light). On the other hand mental states, *e.g.*, volitions, sometimes precede and appear partly to determine physical processes (muscular actions). But the questions what mind and body are in themselves as substances, how they come to be united, and whether there is any real causal interaction between them, are not discussed by psychology.

As a science psychology is bound to accept the fact of the concomitance and the co-variation of the psychical and the physical. Hence it must not set up a mind endowed with its activities out of all relation to nervous processes. On the other hand it must not identify the two in a materialistic way, vainly trying to explain psychical processes by aid of physical. That is to say the essentially heterogeneous character of the two groups of phenomena must not be lost sight of. There is a great deal of loose psychological thinking abroad just now under the guise of 'physiological' psychology. It is supposed that to name the nervous accompaniments or conditions of a mental phenomenon is to explain it. But this is not so. To say that a sensation of light or sound is preceded by certain nervous actions is not to account for it in the full sense. That the mind should be affected in this particular way by this kind of nervous stimulus points to a distinctly mental characteristic which admits of no further explanation. Similarly the perception of a difference between two impressions, for instance those of two colours, is not explained by saying that different nervous elements or processes are involved. The *perception* of difference at all is something distinctly mental, not to be explained therefore by any reference to nervous changes. No sound psychology is possible which does not keep in view this fundamental disparity of the physical and the psychical, and the consequent limits of the physiological explanation of mental facts.[1]

How we Observe and Study Mind: Subjective Method: Introspection. There are two distinct ways of knowing mind. The first is the direct, internal, or subjective way.[2] By this method we direct attention to what is going on in our own mind at the time of

[1] On the relation of Mind and Body considered from the point of view of psychology see Appendix C. Compare Waitz, *Lehrbuch der Psychologie*, §§ 5, 6, 8; Volkmann, *Lehrbuch der Psychologie*, § 15.

[2] 'Subject' means the mind as knowing something, or as affected (pleasurably or painfully) by a thing. 'Object' is that which is known, or which affects the mind in a certain way. The house I see, the flower I admire, are objects to me, the subject who sees and admires

its occurrence, or afterwards.[1] We have the power of turning the attention inwards on the phenomena of mind. Thus I can attend to a particular feeling, say admiration for a beautiful object, in order to see what its nature is, of what elementary parts it consists, how it is affected by the circumstances of the moment, and so on. This method of internal or subjective observation is known as introspection ('looking within').

Objective Method. In the second place we may study mental phenomena not only in our own individual mind but as they present themselves externally in other minds. This is the indirect, external, or objective way of studying mental phenomena. Thus we note the manifestations of others' feelings in looks, gestures, &c. We arrive at a knowledge of their thoughts by their speech, and observe their inclinations and motives by noting their actions.

This objective observation embraces not only the mental phenomena of the individuals who are personally known to us, old and young, but those of others of whom we hear or read in biography, &c. Also it includes the study of minds in masses or aggregates, as they present themselves in national sentiments and actions, and in the events of history. It includes too a comparative study of mind by observing its agreements and differences among different races, and even among different grades of animal life.

[1] Strictly speaking, we never observe a mental phenomenon at the exact instant of its occurrence. All introspection is retrospection. But we distinguish broadly between studying an immediately antecedent mental state, and one which occurred some time before. (See my work on *Illusions,* Chap VIII., p. 190 *n.*)

The study of the simpler phases of mind in the child, in backward and uncivilised races, and in the lower animals, is especially valuable for understanding the growth of the mature or fully-developed human mind.

Finally, the external or objective method includes the study of mental phenomena in connection with bodily and more particularly nervous processes. All external observation of mental phenomena takes place by noting some of their bodily accompaniments (movements of expression, vocal actions, and so on). In addition to this, psychology considers the actions of the nervous system in so far as they affect and determine mental activity. The nature of these enquiries will be indicated presently.

Both Methods must be combined. Scientific knowledge is characterised by certainty, exactness, and generality. We must observe carefully so as to make sure of our facts, and to note precisely what is present. And we must go on from a knowledge of the particular to a knowledge of the general. From this rough definition of what is meant by scientific knowledge we may easily see that neither the internal nor the external method is complete without the other. To begin with: since we only *directly* observe what is passing in our own individual mind, some amount of introspection is the first condition of all certain and accurate knowledge of mental states. To try to discover mental phenomena and their laws solely by watching the external signs and effects of others' thoughts, feelings and volitions, would plainly be absurd. For these external manifestations are in themselves as empty of meaning as words in an unknown tongue, and only receive their meaning by a reference to what we ourselves have thought and felt. On the other hand an exclusive attention to the contents of our individual mind would never give us a *general* knowledge of mind. In order to eliminate the effects of individuality we must at every step compare our own modes of thinking and feeling with those of other minds. The wider the area included in our comparison, the sounder are our generalisations likely to be.

Each of these ways of studying mind has its characteristic difficulties. To attend closely to the events of our mental life presupposes a certain power of 'abstraction'. It requires at first a considerable effort to withdraw the attention from the more striking events of the external world, the sights and sounds that surround us, and to keep it fixed on the comparatively obscure events of the inner world. Even in the case of the trained psychologist, the work is always attended with a peculiar difficulty. On the other hand there is a serious danger in reading the minds of others, due to an excess of the propensity to project our own modes of thinking and feeling into them. This danger increases with the remoteness of the mind we are observing from our own. To apprehend, for example, the sentiments and convictions of an ancient Roman, of a Hindoo, or of an uncivilised African, is a very delicate operation. It implies close attention to the differences as well as the similarities of external manifestation, also an effort of *imagination* by which though starting from some remembered experiences of our own, we feel our way into a new set of circumstances, new experiences, and a new set of mental habits. If children could ever pass their opinion on the observations made on their feelings by adults, they would probably declare a large part of these observations to have been very wide of the mark.[1]

General Knowledge of Mind. As has been observed, science consists of general knowledge, or knowledge expressed in a general form. Hence mental science seeks to generalise our knowledge of mind. In the first place it aims at grouping all the phenomena observed under certain heads. That is to say, it classifies the endless variety of mental states according to their resemblances. In so doing it overlooks the individual differences of minds and fixes attention on their common features.

In the second place, every science aims not only at ordering its phenomena, but at making certain assertions about them. There are general truths or laws which hold good of numerous varieties of phenomena. When the phenomena are occurrences in time, these laws have to do with the relation of events to other events preceding or succeeding them. That is to say, they formulate the relations of causal dependence of phenomena on other phenomena. Mental Science seeks to arrive at such truths or laws of mind. Its

[1] On the errors incident to Introspection and the interpretation of other minds, see my work on *Illusions*, Chaps. VIII. and IX. One of the advantages of the study of mental phenomena in close connection with nervous processes is that it supplies us with exact as well as with general knowledge. For a fuller account of psychological method see Appendix A.

ultimate object is to determine the conditions[1] on which mental phenomena depend.

Now a little attention to the subject will show that mental phenomena are related in the way of dependence not only to other phenomena immediately preceding, but to remotely antecedent phenomena. For example, the quick response of a child to a command depends on the formation of a habit, which process may have been going on for years. Hence the consideration of relations of dependence leads on to the view of mind as a process of growth or development. The most important laws of mind are laws of mental development.

Mind and Nervous Conditions. These laws of mind include truths with respect to the dependence of mental facts on nervous conditions. As already pointed out, in saying that mental phenomena have nervous actions as their conditions, we make no assumption respecting the ultimate nature of mind and body or of their conjunction. All that is meant is that the phenomena of mental life are somehow connected with the activity of the nervous system; that variations in the latter are attended with variations in the former; and that by modifying by purely physical agencies the state of the nervous system, we can indirectly influence the mental accompaniments.[2]

[1] A condition is any circumstance necessary to the production of a phenomenon. All the conditions of a phenomenon taken together constitute its cause.

[2] It is not even implied that the nervous actions precede the mental in time. This is no doubt true in certain cases. The stimulation of a sense-organ and the propagation of the nervous actions to the brain centres precede a sensation. But do the changes in the brain precede the mental phenomena which accompany them? This question need not perhaps much concern us,

The study of this connection of mind and body is a valuable preparation for a systematic study of psychical phenomena. As it is the borderland between physiology and psychology, it is best taken up at the outset. A word or two here must suffice to indicate the range and value of this 'physiological psychology'.

Seat of Mental Life. We all know that mental life is somehow connected with nervous action, and more particularly that of the brain centres. Science asks what is more especially the 'seat' of mental life, what parts of the nervous system are immediately concerned in mental activity. It is agreed that the brain is the 'organ of mind,' but it cannot be said to be certain as yet what the extent of this organ is. Does the activity of all parts of the brain directly minister to conscious life, or only that of certain of its structures? or does the 'organ of mind' include other centres as well as the brain centres?[1]

Localisation of Brain Function. Again, it is important to assign the special parts of the nervous system concerned in particular kinds of mental phenomena. To some extent this is easy. It is clear that sensations of a certain kind, as those of sound, involve a particular peripheral sense-organ, the ear, with a connecting nerve, the auditory. Similarly in the case of voluntary movements, we may trace the particular muscles and connecting nerves. But when we try to find out what special structures in the brain are connected with particular modes of mental activity, science can only help us a little way. The old mapping-out of the brain by phrenologists into distinct organs corresponding to different mental faculties and dispositions has been discredited. Experimental physiology aided by comparative anatomy is determining to some extent the special functions of different parts of the brain, but the certain results obtained as yet are rather meagre.

It is worth noting that there are two opposed views of the correlation

as it is a disputed point whether the cause or conditions do necessarily precede an effect in time. (See J. S. Mill, *Logic*, Book IV., Ch. V., § 6; G. H. Lewes, Problems of Life and Mind, First Series, Vol. II., Prob. V., Ch. II., p. 391.)

[1] On the connection between Mind and Brain see Prof. Bain, *Senses and Intellect*, Ch. II.; also *Mind and Body*, Chaps. II. and III.; Dr. Bastian, *The Brain as an Organ of Mind*, Part IV.; Dr. Maudsley, *The Physiology of Mind*, Ch. II.; G. H. Lewes, *Physical Basis of Mind* (Problems of Life and Mind, 2nd Series), especially Prob. II., Ch. IV.; Prob. IV., Ch. II.; Lotze, *Mikrokosmus*, Buch III., Cap. II. and III.: *cf. Metaphysic*, Bk. III., Ch. V.

between brain activity and mind activity. Some are disposed to carry out the localising tendency so far as to assert that each of the ultimate microscopic elements of the gray substance of the brain (ganglionic cell) answers to a distinct psychical element (sensation, &c.). Others on the contrary look on the brain as always acting as a whole, or at least throughout large tracts, in a variety of ways.[1]

Quantitative Relations of Physical and Psychical Phenomena. When the question of the physical seat of conscious life has been determined, other important questions arise. These concern the quantitative relations of nervous action and mental phenomena. They have been investigated of late in the case of the simple and comparatively accessible phenomena of sensation by experimental methods in a special branch of physiological psychology known as 'psycho-physics'. Among these problems is that of the limit, threshold, or liminal intensity. A certain degree of stimulation is necessary to a sense-impression: this is known as the liminal intensity. It may be found, further, that a certain *extent* of nervous agitation or excitation in the brain is necessary to a mental phenomenon. Again, mental phenomena appear to imply a certain duration of the central nervous process concerned; and this duration is in some cases susceptible of exact measurement. It is probable that there are many changes in the brain which are too rapid to produce any psychical change. Such changes have been described under the name 'unconscious cerebration'. Finally, this line of inquiry deals with variations in the quantity of nervous action and of mental phenomena, and the relation of the one to the other. These investigations carried out in the region of sensation have, as we shall see by and by, led to the most important result of psycho-physical research, what is known as Fechner's Law.

Psychical Effects of varying condition of Nerve Organ. Another group of inquiries closely connected with psycho-physical investigations has to do with the psychical concomitants of changes in the condition of an organ, whether induced by general depression or exalta-

[1] The attempt to localise the several brain functions has been carried on by the aid of comparative anatomy—observing the differences of brain-structure coexisting with differences of mental faculty in races and species of animals; by pathological observation—noting the effects of lesions in different parts of the brain; and by experimental research specially aimed at elucidating the point—electric stimulation of definite regions of the brain, &c. On the question of localising the functions of the brain, see Dr. Ferrier, *The Functions of the Brain; cf.* Prof. Croom Robertson, *Mind,* Vol. VII., 1882, p. 299. On the theory of separate cell-activity, see Prof. Bain, *Mind and Body,* Chap. III., also Chap. V., p. 106 *seq.*; and G. H. Lewes, *Physical Basis of Mind,* Prob. II., Ch. VII. The German reader will do well in addition to consult Prof. Wundt, *Physiologische Psychologie,* 2nd Ed., I., 1er Abschnitt, 5es Cap., § 6.

tion of the nervous energy, or by some local disturbance (change in blood-supply, temporary fatigue, &c.). The way in which the effect of a light-stimulus varies according to the condition of the visual organ forms an important matter of study.[1]

The determination of the way in which the condition of an organ thus modifies the mental phenomenon connected with it is perhaps that department of physiological inquiry which has the greatest practical utility. It is all-important to the teacher to know how the varying state of the brain affects mental efficiency. Now owing to the present imperfect state of our knowledge respecting the particular portions of the brain concerned in particular modes of mental activity, we are not able to determine the relation between the two with scientific precision. At the same time we have certain generalisations respecting the variations of mental activity that accompany variations in the condition of the brain as a whole, which it may be useful to indicate here.

Brain Efficiency and Mind Efficiency. It is abundantly proved alike by everyday observation and by scientific experiment that the amount of mental activity possible at any time is limited by the quantity of disposable energy in the brain. The more vigorous the brain at any time, the greater the amount of mental expenditure possible. This applies not merely to intellectual work, but also to feeling and action. A healthy and vigorous brain is the condition of numerous and vivid feelings, and of energetic actions.

[1] Some aspects of this relation are dealt with, along with the whole question of the correlation of physical and psychical changes, by H. Spencer, *Principles of Psychology*, Vol. I., Pt. I., Chap. VI. (*Æstho-physiology*).

On what Efficiency of Brain Centres depends. The state of the brain, its degree of readiness for work, fluctuates with the degree of disposable energy of the nervous system as a whole. This is affected by regular or periodic causes, the changes incident to the natural alternating rhythm of waking and sleeping. It is also affected by irregular circumstances, such as changes of bodily health, and the exhaustion due to great mental agitation.

In the second place, the condition of the brain, like that of all other organs, is affected by the extent to which the particular structures have recently been exercised. After long and severe brain-work of any kind, the organ becomes fatigued and incapable of further work. On the other hand, a prolonged rest, as during a summer holiday, leaves the organ with the maximum degree of disposable energy.

So far as we are sure of the existence of special centres we may apply the same considerations to these. The condition of any given centre, say that of vision, will vary according to the amount of work recently done. One part of the brain may in this way be much more vigorous than another. At the same time it is to be remembered that the several parts of the brain stand in the closest organic connection one with another, and that great exhaustion of any one part will affect the degree of efficiency of the other parts. It follows, too, that since (as we shall see more fully by and by) all kinds of mental work involve *attention*, the centres especially concerned in this activity will become fatigued in every case as the direct consequence of mental strain or effort.

Need of Brain Rest. It follows from these truths that in order to maintain brain efficiency we must supply the necessary conditions of repose and alternation of activity. After a certain amount of work the brain should be allowed to repose as a whole. An approximate condition of repose is reached by play, which by calling forth the muscles into easy and familiar modes of activity relieves the higher centres of attention and thought.

Within these limits of extreme and general fatigue of the brain, efficiency can only be secured by varying the kind of work so as not to tax any one region of the brain overmuch. A change from manual to vocal exercise in the Kinder-garten may be taken as an illustration of this rule.

Relation of Psychology to other Sciences. Psychology is a positive science dealing with a certain class of phenomena, and to this extent is on a level, or co-ordinate, with the special physical sciences, as chemistry, botany, and so on. Not only so, owing to the connection between nervous and mental processes, psychology enters, as we have seen, into a peculiar relation with physiology. On the other hand, psychology is above, and complementary to. the special sciences. For in considering mind, it views knowing as a mental phenomenon, as an operation or process in our mental life. Thus all knowing, whether of chemistry, botany, or physiology, inasmuch as it is the activity of some mind or knowing subject, is a part of the subject-matter of psychology. In other words, mental science considers what goes on in the mind when we know. At the same time, it does not enquire into the truth or falsity of this knowing. It simply views the process of knowing on its subjective side, and leaves the consideration of knowledge on its objective side, as true or valid, to Philosophy or Theory of Knowledge which includes Logic.

Psychology and Practical Science. Psychology is a theoretic, as distinguished from a practical science. A theoretic science concerns itself about things as they are, how they happen or come to pass. A practical science concerns itself with things as they ought to be, or as we wish them to be. Practical science, though thus contrasted with theoretic, is really very closely connected with it. In order to gain our end, we must have a certain knowledge of the nature of the agencies we employ. Thus a sculptor must know something about the properties of clay and marble, a physician something about the functions of the body, and so on.

Viewed in this way, psychology forms the basis of a number of practical sciences. All the practical sciences, indeed, which aim at guiding or influencing our thoughts, feelings, or actions, have their footing in psychology. Thus the principles of oratory, of legislation, and so on, are based on a knowledge of the properties and laws of the human mind. These relations may be roughly set forth as follows :—

(A.) Psychology as a whole supplies the basis of Education, or the Practical Science which aims at cultivating the mind on the side of Knowing, Feeling, and Willing alike.

(B.) In its special branches, psychology supplies a basis to the following practical sciences:—

Psychology of Knowing—Logic, or the regulation of reasoning processes; together with the allied arts, rhetoric, or the art of persuasion, and that of forming opinion.[1]

Psychology of Feeling—Æsthetics, or the regulation of feeling according to certain rules or principles, to wit, the admirable, or beautiful.

Psychology of Willing—Ethics, or the determination of the ends of action and the regulation of conduct by principles of right and wrong; together with the allied arts of politics and legislation.

We see at once from this rough scheme the peculiarly close connection between Psychology and Education. This is the only practical science which is engaged in guiding or controlling the whole of mind. The educator of the young may be said to unite in himself the functions of logician, art critic, moralist and legislator. He has to direct thought, to cultivate feeling, and to control action.

We may still further see the closeness of this connection by glancing at the dependence of Education on other sciences. As a practical science which aims at an end, Education must lean on Ethics, which seeks to determine the true ends of all action, the ultimate nature of what we call good and desirable. But this implies a limited connection only. When once the end is settled, Education asks no more aid from Ethics. Again, as a practical science greatly concerned with the training of the thinking or reasoning powers, Education derives considerable aid from Logic. This study by supplying rules for clear thinking and sound rea-

[1] That is so far as the process is a strictly intellectual one. So far, however, as it involves appeals to feeling it falls under the next head.

soning, and by pointing out (to some extent) the best methods of expounding knowledge, is a matter of great practical value to the teacher. The relation of Education to Psychology is, however, a closer and a more pervading relation. Being a theoretic as distinguished from a practical science, it does not, it is true, give rules for regulating mind. But it gives us an account of mind as a whole, the way in which it operates, the laws of succession and dependence which govern mental phenomena, and lastly a theory of mental growth or development. And since Education in all its branches is engaged in producing some mental result (*e.g.*, accurate knowledge, good feeling), it needs continually to revert to psychology.[1]

APPENDIX.

For a fuller account of the scope and method of psychology, see Sir W. Hamilton, *Lectures on Metaphysics*, Vol. I., Lects. VIII., IX. ; H. Spencer, *Principles of Psychology*, Vol. I., Pt. I., Chap. VII. ; G. H. Lewes, *Study of Psychology* (Problems of Life and Mind, 3rd Series, Prob. I.), especially Chapters IV., V., VI., and VIII. The German reader will do well to consult Waitz, *Lehrbuch der Psychologie* (Einleitung) ; Volkmann, *Lehrbuch der Psychologie* (Einleitung) ; and especially Brentano, *Psychologie*, 1es Buch. Some valuable remarks on this subject are to be found in an article by G. Croom Robertson, *Psychology and Philosophy*, in *Mind*, Jan., 1883 ; and in an article by James Ward, *Psychological Principles*, in *Mind*, April, 1883. On the relation of Education to Psychology, see J. S. Mill, *Logic*, Book VI., Chap. V., Ethology ; Prof. Bain, *Education as a Science*, Chap. I. ; Th. Waitz, *Allgemeine Pädagogik* (Einleitung, § I.). Some good suggestions on the method of a science of education may be found in J. S. Mill's *Logic*, Book VI., Chap. IV.

[1] I have not touched on physical education here. This plainly rests on physiology, just as mental education reposes on psychology.

CHAPTER II.

MENTAL OPERATIONS AND THEIR CONDITIONS.

Mental Phenomena and Operations. Mental Science consists, as we have seen, of an orderly arrangement of the truths, or laws which relate to mental phenomena. The aim of the Science is to establish as many general statements or propositions about mind as possible. In order to this we have first to ascertain what our phenomena are, and to arrange them in general groups or classes, based on fundamental points of likeness.

Mental phenomena are known by different names. They are commonly called states of mind, or states of consciousness. Again, since they are phenomena in time, having a certain duration and a succession of parts, they are just as often spoken of as mental processes or operations. It is to be added, however, that we sometimes distinguish between a mental process or operation and its result or product. Thus, as we shall see, we distinguish between a process of perception, and its result, a percept.[1]

[1] The importance of the distinction between process and result will appear when we come to speak of the conditions of mental phenomena. The term operation, as employed in the older psychology, is the correlative of the term faculty, or power, to be spoken of presently. (See Sir W. Hamilton, *Lectures on Metaphysics*, I., Lect. X., p. 179.) The difficulty of describing all mental phenomena by one word has given rise to the invention of new names, as 'mentation' and 'psychosis'.

Analysis of Mental Operations. At any one moment our mind presents a complex mass of mental phenomena or an intricate chain of mental operations. For example, when a person is sitting out of doors on a summer day, his mind is receiving numerous impressions of sight, sound, touch, &c., which affect him agreeably or otherwise; at the same time, perhaps, it is carrying on a train of imagery, recalling a sequence of past events, or fancying some bright future. At any one moment the mind is a sort of tangle of psychical states or threads of psychical processes. It is the business of the psychologist to unravel this tangle and to take apart the threads. This is called analysis (splitting up, taking apart).[1] By so doing he resolves a complex mental state into its simple elements, a complex operation into its constituent parts. Thus in the case supposed the introspective observer might distinguish between the pleasurable sensations of light, sound, &c., and the train of images passing through his mind.[2]

Classification of Mental Operations. In thus breaking up or analysing a complex mental state, the observer is at the same time classing its parts with those

[1] On the nature of psychological analysis, see Sir W. Hamilton, *Lectures on Metaphysics*, Vol. II., Lect. XXI., pp. 21, 22. Stumpf, *Tonpsychologie*, § 6.

[2] This analysis implies a twofold mental separation—viz., that of coexistent or contemporaneous elements, and of successive elements. In order that there should be any such ideal separation there must be some difference between the parts. But we are not always able to analyse a complex mental state into its parts. Psychical elements sometimes coalesce in an indistinguishable mass. This is seen in the case of apparently simple sensations. (See my work on *Illusions*, pp. 52, 53; *cf.* *Sensation and Intuition*, Chap. III., p. 57, &c.) The temporal division of psychical processes into successive parts is limited by the fact that a certain minimum duration is necessary for a distinct mental state.

of other complex states. Thus in distinguishing certain sensations from images he is referring to a class, sensations, and a class, images. In other words, he is making the beginning of a classification of mental operations.

Common popular thought has long since drawn certain distinctions among mental phenomena. Thus in our everyday language we describe particular sorts of mental operations as perceptions, judgments, and so on. All science is nothing but common knowledge made more precise and systematic. Hence mental science naturally sets out with the rough classifications adopted by popular psychology.

If we examine these everyday distinctions we find that there are three fairly clear divisions which do not seem to have anything in common beyond being classes of mental phenomena. Thus we ordinarily describe such facts as perceiving, remembering, and reasoning as *intellectual* operations. So again we bring sorrow, joy, love, anger, and so on, under the general description of *feeling* or *emotion*. And finally, we gather up operations like purposing, deliberating, doing things, under the head of *will*. We broadly mark off these three sides of mind, and talk of men as exhibiting now one and now another aspect.

Feeling, Knowing, and Willing. Mental Science adopts this threefold division. (1) Under *Feeling* we include all pleasurable and painful conditions of mind. These may be very simple feelings, such as the so-called bodily distress of hunger, or the pleasure of the palate. Or they may be of a more complex nature, such as love, or remorse. (2) *Knowing*, again, includes all operations which are directly involved in knowing, as, for xample, observing what is present to the senses, recalling the past, and reasoning. (3) Finally, *Willing* or *Acting* covers all active mental operations, all our doings, such as walking, speaking, attending to things, together with efforts to do things, active impulses and resolutions. The perfect type of action is doing something for an end or purpose. This is what we ordinarily mean by doing a thing with will, or voluntary action. The term *Willing* may be conveniently extended so as to cover all the phenomena of the third head. When, however, we so employ it we must be careful to understand that we are including not only voluntary actions and volitions, in the full sense of these words, but also other and simpler modes of action, such as random or purposeless movements.

Opposition between Knowing, Feeling, and Willing. These three kinds of mental state are, as we have seen, in general clearly marked off one from another. A child in a state of strong emotional excitement contrasts with a child calmly thinking about something, or another child exerting his active powers in doing something. If we take any one of these aspects of mind in a well-marked form, we see that it is opposed to the other aspects. Thus strong feeling is opposed to and precludes at the time calm thinking (recollecting, reasoning), as well as regulated action (will). Similarly the intellectual state of remembering or reasoning is opposed to feeling and to doing. The mind cannot exhibit each kind of phenomenon in a marked degree at the same time.

This opposition may be seen in another way. If we compare not different states of the same mind, but different minds as a whole, we often find now one kind of mental state or operation, now another in the ascendant. Minds marked by much feeling (sensitive, emotional natures) commonly manifest less of the intellectual and volitional aspects or properties. Similarly, minds of a high degree of intellectual capability (inquiring or inquisitive minds), or of much active endowment (active minds) are as a rule relatively weak in the other kinds of endowment.

Connection between Knowing, Feeling, and Willing. Yet while knowing, feeling, and willing are thus broadly marked off from, and even opposed to, one another, they are in a way closely connected. A mind is not a material object which can be separated into distinct parts, but an organic unity made up of parts standing in the closest relation of interdependence. Or to put it another way, feeling, knowing, and willing are *properties* of mind, and cannot exist in perfect isolation from one another any more than the colour, form, and so on, of a plant. If we closely examine any case of feeling we find some intellectual and volitional accompaniments. Thus when we experience a bodily pain (feeling), we instantly localise the pain or recognise its seat (knowledge), and endeavour to alleviate it (volition). Most of our feelings, as we shall see, are wrapped up with or embodied in intellectual states (perceiving, remembering, &c.). Again, intellectual operations, observing, thinking, &c., are commonly accompanied by some shade of agreeable or disagreeable feeling, and they always involve voluntary activity in the shape of attention or concentration of mind. Finally, willing depends on feeling for its motives or impelling forces, and on knowledge for its illumination or guidance.[1]

Owing to this close connection between knowing, feeling, and willing, we find that a mind characterised by the predominance of any one of the three phases is commonly distinguished further by certain features belonging to the other two phases which are specially related to the first. Thus a person of a highly intellectual cast of mind will usually exhibit certain feelings, as the sentiment of consistency and truth, in marked intensity, and at the same time show a measure of strength of will under the form of determined concentration. Again men and women endowed with copious and vivid feelings are as a rule distinguished by a special mode of intellectual capability, namely a rapid imaginative insight into things. And lastly those who are characterised by great strength of will are commonly endowed as well with powerful emotional impulses (duly controlled) and by intelligence of a useful and practical kind.

The relation of Feeling, Knowing, and Willing one to another is roughly indicated in the common dis-

[1] It has been said that every mental state is compounded of three elements or factors, namely, a feeling, an intellectual process, and a motor impulse. See G. H. Lewes, *Problems of Life and Mind*, First Series, p. 146, and Third Series (Vol. II.), p. 240. Others, as Mr. James Ward, put it this way: The simplest mental phenomenon includes the presentation of some object to the subject (intellectual element), an attendant feeling (pleasure or pain), and a mode of action, viz., volitional attention. The close connection between knowing, feeling, and willing, &c., is seen in the lengthy discussion of the question as to what phase of mind is the most fundamental. The Herbartian psychologists are wont to look on the intellectual phase as the fundamental one, and to derive feeling from intellectual activity. (See Appendix B.)

tinction between the passive and active sides of mind. On the one hand, feeling is (comparatively) passive, and so is set in contrast with willing, which is active. Knowing, on the other hand, is called passive-active, because while it depends for its material on passive receptivity, it involves the active control of its operations by means of voluntary attention.[1]

It follows that our threefold division of mind is a division according to the most prominent feature or aspect. Though we cannot find a pure state of feeling, we find many states of mind which exhibit the aspect of feeling, the pleasurable or painful colouring, in a more marked degree than the other two aspects. Similarly in the case of states of knowing and willing. By this means we are able roughly to classify all mental states by attending to their more prominent or strongly marked aspect. It rarely happens that two aspects are so nearly equal in their prominence as to occasion any difficulty in referring a mental state to one of these three classes.

Species of Knowing, Feeling, and Willing: Mental Faculties. Popular psychology recognises certain divisions or species of knowing, feeling, and willing under the head of faculties, capabilities, powers, and so on. More particularly we speak of Intellectual Faculties, such as Perception and Imagination; Emo-

[1] Intellect is also called active by Kant and others, in the sense that it involves a principle of synthetic combination. This is supposed to be a spontaneous creative energy of the mind. But this question goes beyond empirical psychology and touches the nature of the intelligent subject, which is a question of philosophy.

tional Capacities, as Love, Anger; and Active Powers, such as Movement, Choice, Self-control.[1]

These distinctions are valid so far as they go. The psychologist allows that perceiving and remembering differ in certain important respects. The first operation contains elements (*e.g.*, actual sense-impressions) which the second does not contain. Thus there is a real psychological distinction involved, and the psychologist will find it here as elsewhere convenient to make this popularly recognised distinction the starting-point in a scientific treatment of the phenomena of mind.

Analysis of Faculties. In adopting these popular distinctions, however, the psychologist does not imply that the several processes of perceiving, remembering, and so on, are distinct one from the other fundamentally, that is to say with respect to their elementary parts. While we set out with these well-marked divisions of faculty, we seek to discover by a deeper psychological analysis certain more fundamental or primary distinctions, and to regard such differences as those between perceiving, remembering, and so on, as secondary. That is to say, we endeavour to break up the several processes of perceiving, &c., into simpler or more fundamental operations, of which we regard them as so many various modifications or modes of combination

The discussion of the ultimate nature of the so-called faculties and powers of the mind belongs to rational psychology, or that branch of

[1] For a discussion of the proper use of the terms faculty,' 'capacity,' and 'power,' see Sir W. Hamilton, *Lectures on Metaphysics*, Vol I., Lect. X., p. 174, *seq.*

philosophy which treats of mind as substance. The hypothesis of faculties can, however, be criticised from the point of view of empirical psychology in so far as it succeeds or does not succeed in giving a clear account of the phenomena. Looked at in this way, it must be regarded as productive of much error in psychology. It has led to the false supposition that mental activity, instead of being one and the same throughout its manifold phases is a juxtaposition of totally distinct activities answering to a bundle of detached powers, somehow standing side by side, and exerting no influence on one another. Sometimes this absolute separation of the parts of mind has gone so far as to personify the several faculties as though they were distinct entities. This has been especially the case with the faculty or power of willing.[1]

Fundamental Intellectual Operations: Functions. Employing this instrument of 'analysis,' the psychologist seeks to reduce the several sorts or varieties of intellectual operations, such as perception and judgment, to more fundamental processes. The essential operation in all varieties of knowing is the detecting of relations between things. The most comprehensive relations are difference or unlikeness and agreement or likeness. All knowing means discriminating one impression, object, or idea from another (or others), and assimilating it to yet another (or others). I perceive an object as a rose only when I see how it differs from other objects and more especially other varieties of flower, and at the same time recognise its likeness to other roses previously seen. And so of other forms of knowing. Hence Discrimination and Assimilation have been called properties or functions of intellect.

Another property of intellect, according to Prof. Bain, is Retentiveness. All knowledge clearly implies the capability of retaining, recalling, or reproducing past impressions. But retentiveness occupies a different

[1] The 'faculty-hypothesis' has been severely dealt with by Herbart and his followers. See Wundt, *Physiologische Psychologie*, 2nd Ed., Pt. I., p. 17.

place in knowing from that of discrimination, &c. It is rather the condition of knowing, of coming to know and continuing to know than a part of the active knowing process itself. Besides, as we shall see later, it is the principle which underlies the growth or development of intellect, and not only of this, but of mind as a whole. The same remark applies to the capability or function of grouping or combining simple psychical states (sensations, &c.) into compound states. This capability is, as we shall see by and by, closely related to that of retentiveness, and is along with this involved in the whole process of mental development.[1]

Grades of Intellectual Operation. By thus assuming certain fundamental intellectual functions we are able to regard the distinctions of perceiving, imagining, and so on, as so many grades or stages of knowing. They become forms or modes of the fundamental processes of various degrees of complexity In this way we obtain a scale of intellectual processes. Thus, at the lower end we have, in what is commonly called sensation, the discrimination of a *sense-impression* from others: in perception, a marking off of a group of impressions under the form of an *object* or thing; in thinking, the separation of a whole *class* of objects. This serial arrangement of intellectual operations prepares the way for a theory of mental growth or development.

Truths or Laws of Mind. As was observed just now, the psychologist analyses and classifies mental phenomena in order to go on to establish general propositions about them. These are known as truths of mind. The most important of them are commonly

[1] For an account of the fundamental intellectual processes, see Prof. Bain, *Senses and Intellect—Intellect*, pp. 321-327: compare H. Spencer's theory of 'relations between feeling,' *Principles of Psychology*, Vol. I., Pt. II., Chap. II., and Vol. II., Pt. VI., concluding chapters, especially XXVI. and XXVII.; also G. H. Lewes's distinction of function and faculty, *Study of Psychology* (Problems of Life and Mind, 3rd Series, Prob. I.), p. 27.

spoken of as laws of mind. These truths or laws set forth the relations between certain psychical phenomena and other phenomena, psychical or physical. These relations are for the most part relations of succession and dependence. The truth or law formulates the causal connection between a phenomenon and its antecedents or accompaniments. That is to say, it seeks to account for a phenomenon by enumerating the conditions which are necessary to its production.

Here again mental science is supplementing and rendering precise the inductions reached by popular thought. Men have for ages observed certain relations of dependence between circumstances and character, and one trait of character or habit and another. All the well-known sayings about character and life embody these observations. Such trite remarks as "experience is the best teacher," "first impressions last longest," contain the rough germ of psychological truths. The psychologist seeks to take up these wise sayings into his science, embodying them in larger and more accurate propositions, that is to say in laws.

Special and General Conditions and Laws. If we consider the conditions of any class of intellectual operations, we find that some are special and peculiar to the class whilst others are of a more general character. Thus a perception will be found to have as its special conditions a present sense-impression and a recalled group of past impressions; while it will be seen to depend too on attention which is a much wider and more general condition. The psychologist seeks to generalise to the utmost the conditions of mental phenomena. Among the very general conditions is change of impression or contrast of mental state, which seems necessary to any kind of continued mental activity. To set forth such more general conditions is to formulate the highest laws or first principles of psychology.

Sum of Conditions. In order to explain any class of mental operation, it is needful to specify *all* the conditions whether special or general which co-operate in bringing it about. This will compel us, in certain cases at least, to take note not only of *proximate* or immediately preceding (or accompanying) circumstances but also of *remote* antecedents. Thus, to account for the remembrance of a thing we must specify not only the presence at the time of something which reminds us of that thing but also the fact that the reminder and that of which it reminds us have been conjoined or 'associated' in our past experience.

It is to be observed that in so far as any mental operation is complex, consisting of distinguishable parts and successive steps, we are wont to view the final outcome as the product which depends on the several elementary operations or steps taken together as its conditions. Thus we distinguish between the process of perceiving and the product or percept, the process of abstraction or conception and the result or concept. Hence we may speak of explaining or accounting for such a final product by enumerating all the parts or constituent elements of the operation. To analyse an operation of mind is thus in a manner to assign its conditions and account for it. Thus we explain a percept, that is, the result of the process of perception, by unfolding the mechanism of the process, distinguishing its stages, the reception of a sense-impression, the recalling of a group of conjoined impressions, and so on.[1]

Attention as a Condition of Operations. Among these constituent parts of an operation none is more important than attention. This, as has been remarked, is a general condition of mental operations. Knowing, feeling, and willing, in so far as they are vivid and distinct phases of mental life, involve attention. The dependance of the several kinds of intellectual operation on the activity of the attention is a truth which will be illustrated in the course of our exposition. Here it is only necessary to single it out for special mention. In so far as intellectual processes are active, involving concentration, they come under the laws of attention (interest, &c.).

Favourable and Unfavourable State of Mind. Among the conditions which help to determine a mental result we must not overlook the whole mental circumstances or composite state of the mind at the time. The effect of calmness of mind and of emotional agitation respectively on intellectual operations is a matter of every day observation. Our

[1] It is often a nice question whether any particular operation A is to be regarded as distinct from another B, though necessary to it, or as entering into this last as one of its elements. For example, is attention a part of what we mean by discrimination, or is it merely something which must be present in order that discrimination may take place? But this is of little practical moment. If we adopt G. H. Lewes's view that an effect is nothing but the sum of its conditions, the difficulty disappears altogether (see his treatment of the idea of Cause, *Problems of Life and Mind*, First Series, Vol. II., Prob. V., Chap. II., p. 388 *seq.*).

minds are prepared for a special mode of activity in very different degrees. After a disturbing shock attention requires time to recover its balance, and so intellectual operations are interfered with.[1]

Nervous Conditions. In specifying all the conditions of a class of mental operations we must refer not only to psychical but to physical circumstances. More particularly we need to specify a vigorous state of the organs concerned. This applies not only to intellectual operations, as learning or acquiring knowledge, but also to feelings and actions. A vigorous state of the brain is a condition of lively feeling, as of energetic intellectual activity. And as we shall see, voluntary action is modified by the varying state of the motor organs.

It seems impossible even to assign a definitely restricted region of the nervous system to each of the three fundamental phases of mind, feeling, knowing, and willing. The nervous system is made up of nerves and nerve-centres. The first consist of sensory, or incarrying, and motor, or outcarrying, nerves. The centres, again, consist of sensory centres which receive excitation from without by way of the incarrying nerves, and motor centres which excite or 'innervate' the outcarrying nerves. These sensory and motor centres are intricately connected one with another in sensory-motor aggregates, and these aggregates again form a closely connected series of sensory-motor centres of increasing degrees of complexity. Following this double division we should have as a corresponding psychological division sense-impressions and ideas derived from them, and movements or actions. But knowing consists in the detection of relations among impressions, &c., and this implies the activity of certain motor centres. Again, feeling though closely bound up with sense-impressions, and so involving the action of sensory nerves, involves in

[1] For practical purposes it is often sufficient to name a few of the most important conditions of mental operations. Thus, for example, in a case like that of constructive imagination or of conception (forming notions), it may suffice to say that the main conditions are *(a)* materials to work with (images), *(b)* interest or motive, and *(c)* favourable circumstances, freedom from mental preoccupation and distraction.

its expression the action of motor centres as well. And though willing answers roughly to the action of the motor side of the nervous system, it involves, in connection with the elements of feeling and knowing present, the action of the sensory side too. Hence only a very rough physiological mapping out of the mental functions is practicable.[1]

Individual Differences of Mental Capability. Mental operations are not precisely similar in all minds. They vary in certain respects, and these variations are referred to differences of mental power or capacity. Now as we have seen, psychology as science has to do with the general facts and truths of mind. It takes no account of individual peculiarities. Nevertheless, the practical importance of estimating individual differences has led psychologists to pay considerable attention to this concrete branch of their subject.[2]

The particular problem to be discussed here is the possibility of estimating with an approach to scientific precision the several differences of mental capability that we find among individuals.

How Minds Vary. One mind may differ from another in respect of one whole phase or side of mind. Thus we speak of one man or one child as more intellectual or more enquiring than another. Similarly one mind has more emotional susceptibility, or more active impulse or will than another.

Again, we may make our comparison more narrow, and enquire how one mind differs from another with respect to a special mode of intellectual (or other)

[1] On the physiological correlatives of feeling, cognition, and action, see G. H. Lewes, Problems of Life and Mind, Third Series, Vol. II., Prob. III., Chap. II. ; and A. Horwicz, *Psychologische Analysen*, Theil I., Sect. 24.

[2] The relation of this branch (concrete psychology) to abstract psychology is well brought out by S. Bailey, *Letters on the Philosophy of the Human Mind*, 2nd Series, Letter XVIII., &c

operation. Thus we ask whether one mind has more discrimination or a finer sense of difference than another, or whether it is endowed with a keener sense of likeness. Or we may take some special faculty, and enquire how two minds differ in respect of observing, imaginative, or reasoning power. Or, finally, we may select some particular mode of operation of a faculty, and compare two minds with respect to their perception of objects in space, or of events in time: their memory for things (visible objects), for names, and so on.

Measurement of Mental Faculty. In order to make our comparison of one mind with another exact, we ought to be able to measure one against the other. This is only possible, in most regions of mind at least, in a very rough way. Mental phenomena are not material objects the size of which can be accurately estimated by juxtaposition. Yet, if rough, these measurements may serve as useful data for practice.

Quantitative Aspects of Mind. Mental operations have three quantitative aspects, each of which is susceptible of measurement more or less exact. These are degree, duration, and number.

(A) *Degree.*—By the degree of a mental state or phenomenon is meant its intensity. Our sensations and feelings clearly vary in intensity. We can say that one impression is more vivid than another, one feeling more acute than another, and so on. Our actions, too, differ in degree according to the amount of energy we consciously expend.[1] And our intel-

[1] Another aspect of the degree or intensity of action is the amount of effort involved.

lectual operations similarly display differences of degree. Thus we speak of the degree of distinctness and vividness of an impression or of an idea. Also we may speak of the degree of activity (attention) involved in an intellectual operation.

(B) *Duration.*—The duration of operations is a matter which lends itself peculiarly well to exact measurement. For time is susceptible of *objective* estimation, that is to say, of measurement by means of an external standard, such as a clock.[1] Our measurements of the intensity or degree of mental states are rough. Thus, we can only say that one operation is 'easier' than another, or at best that it is 'much easier'. With respect to duration, however, it is possible to measure exactly by means of external arrangements. The most important recent measurements of mental phenomena have been under the aspect of duration. The simpler mental processes, sensation and perception, and even more complex processes, as sequences of ideas, have been subjected to this mode of measurement.

(C) *Number.*—In order to estimate number it is enough that we can distinguish one operation from another, or one stage of an operation from another. We measure mental processes, such as trains of thought, under this aspect when we compare the number of distinct steps involved in them. The estimate of the complexity of a mental state, for example a 'flight of fancy' or a mingled emotion,

[1] An objective estimate contrasts with a subjective estimate which rests on the impression or feeling of the individual mind, and which is highly variable and uncertain.

takes place by reckoning the number of elements or details of which it is made up.[1]

Modes of Measuring Faculty. There are two well-marked methods of measuring faculty: (1) by making the external excitant or *stimulus*[2] equal in two (or more) cases, and comparing the mental reactions, or (2) by inquiring what difference in the stimuli is required to bring about equal mental reactions in two cases. Although these methods can only be applied with any degree of exactness in the simpler region of mind, sensation, they may be employed roughly in other regions as well.

First Method.—In this case we must be careful to make the stimulus equal as far as possible in two cases, and compare the psychical results. Thus we might test the discriminative sensibility of two persons by presenting exactly the same amount of 'objective' difference, *e.g.*, between two shades of colour or two degrees of brightness of one colour. Here we must be careful to make the circumstances equally favourable to discrimination in all respects. Thus the object presented must be similarly placed in relation to the observers. Also, the external circumstances and the internal state of mind must be equally favourable to concentration of the attention.

Having thus made the stimuli equal, we compare

[1] When the parts are not distinguishable, and therefore discrete quantity not capable of being estimated, we may try roughly to estimate continuous quantity under the form of extensity, including the volume or 'mass' of an emotion.

[2] By stimulus is meant strictly an external agent (as mechanical pressure) applied to a sense-organ (*e.g.*, the hand) which it is capable of exciting to activity. The word may be extended so as to include all excitants of mental activity.

the reactions as to quantity. Thus the sense of difference in one case may be more distinct and vivid than in another. A much better criterion is duration. If one person detects a difference sooner than another under precisely similar circumstances, he has the greater discrimination in that region of impression. In complex operations number may enter into the estimation. Thus if the power tested be that of imagination or the faculty of picturing visible objects, it may be found that one person is able to form fuller and more complete pictures than another under similar circumstances.[1]

Second Method.—The second method has certain advantages over the first. In general we can compare quantitatively two stimuli much better than their psychical results. We can make one physical agent twice or three times as large as another, but we can never say that one mental impression is three times as strong or vivid as another. Moreover it is possible, in some cases at least, to fix on a definite quantity of psychical effect and make this our unit of comparison. This is done by taking the *smallest quantity of an effect that is perceptible or recognisable.* Thus the best way to measure the power of discrimination in the region of sense-impressions is to find by experiment the amount of objective difference, that is, the amount of difference between two agents or stimuli (*e.g.*, weights laid on the hand, &c.), that will just produce a sense of difference; in other words, be barely

[1] Another point to be noted is the amount of effort involved in the two cases. This, however, might be due to one of two causes—*(a)* inequality in the power of directing the attention, *(b)* inequality in the discriminative (or representative) power.

recognised as a difference. The smaller this minimum difference, the greater will be the corresponding discriminative power. This method, as we shall see, has recently been carried out in the region of sensation with remarkable results. We may perhaps extend it in a less exact form to the measurement of other and more complex mental operations. Thus we might roughly test two persons' memories by comparing the force of suggestion, or the number of suggesting circumstances, necessary to a bare revival of an impression in any measure in the two cases. The difficulty here would of course be to make sure that all other circumstances were the same, that the two persons had had equal experience of the impressions to be recalled, &c.

The problem of estimating with quantitative accuracy individual differences of mental capacity is still in its infancy. The attempt to gauge individual differences by a reference to permanent bodily peculiarities in the doctrine of temperaments has been generally discredited. The same must be said of the phrenological attempt to assign differences of individual mind to variations in certain faculties localised in definite portions of the brain. It rested on a sharp separation of faculties which was psychologically unsound, and which involved as well bad physiology. A beginning according to a strictly scientific method has been made in the region of sensibility in connection with psycho-physical inquiry. But so far as I know, the honour of planning a systematic measurement of mental capacity belongs to Mr. F. Galton.[1]

[1] The subject of Temperament has been treated by L. George, *Lehrbuch der Psychologie*, 1er Theil, §§ 6, 7; Volkmann, *Lehrbuch der Psychologie*, 1es Hauptstück D, § 31. The Phrenological Hypothesis has been criticised among others by Prof. Bain, *On the Study of Character*, Chaps. II.-VI.; also by Volkmann, *Op. cit.* D, § 30. Good observations on individual differences of intellectual power are to be found in Prof. Bain's book, especially Chaps. X., XIII., XIV., and XV.; also in L. George's work, 1er Theil, §§ 7, 9. For an account of Mr. Galton's plan, see an article on *The Anthropometric Laboratory* in the *Fortnightly Review*, March, 1882; cf. his volume *Inquiries into Human Faculty*, section *Bodily Qualities*, p. 19, and following sections.

Bearings of foregoing on Education. A word or two may suffice to indicate the more important bearings of this chapter on the art of Education. To begin with, since Education is engaged with exercising the faculties of the mind—memory, judgment, and so on, it is well for the Educator to know what these are, that is to say, what mental processes are covered by the words. A careful analysis of the operations of mind carried to a certain point is necessary to a perfect grasp and comprehension of educational processes. For example, a teacher cannot intelligently exercise a child's powers of observation (perception) till he grasps the fact that observation implies discrimination, the marking off of the several peculiarities of colour, shape, and so on, of an object from those of other objects.

It is obvious, further, that a knowledge of the laws of mental operations, in other words, of their conditions, is a matter of the greatest practical utility to the Educator. Since his aim is to call forth a faculty into exercise, that is to say, to bring about a particular mental result, he needs to know the laws according to which the particular faculty operates, or the conditions on which the particular result depends. Thus in order to render the meaning of words clear and definite to a child's mind he will do well to note the conditions on which clear notions or concepts in general depend, such as familiarity with a wide variety of concrete examples.

Again, though the art of Education is concerned more immediately with the intellectual than with the other operations of mind, it cannot afford to be ignorant of these. The teacher is expected to help in moulding the taste and in forming the moral character of his pupils, and here some knowledge of the feelings and the will and the laws which govern them is of importance. And even if we look upon the function of the teacher as having to do exclusively with the exercising of the intellectual powers, we shall still see that some knowledge of the processes of feeling and willing is necessary; for feeling and willing under the form of interest and voluntary application of mind are in a measure involved in intellectual work.

Finally, in order to give due flexibility to his system of training, and to adapt it to the numerous differences of capacity and tastes among children, the teacher should be able to compare individual minds as exactly as possible. Hence a knowledge of the means which are at our disposal here will be of practical use.

APPENDIX.

On the threefold Division of Mind and the nature of the '*Faculties*,' see Sir W. Hamilton, *Lectures on Metaphysics*, I., Lect. XI.; Prof. Bain, *Senses and Intellect* (3rd Ed.), Introduction; James Ward, second article on *Psychological Principles*, in *Mind*, October, 1883. The German reader will find some good remarks in Drobisch, *Empirische Psychologie*, Vorbegriffe, § 2; Lotze, *Mikrokosmus*, 2es Buch, 2es Kap. The common threefold division is dealt with historically and critically by Drobisch, *Op. cit*, 5er Abschnitt, II.; by Brentano, *Psychologie*, 5es Cap.; and by Wundt, *Physiologische Psychologie*, 2nd Ed., pp. 11-18.

CHAPTER III.

MENTAL DEVELOPMENT.

Mental Development Defined. In the last chapter we were concerned with ascertaining the nature and conditions of the several kinds of mental operation, without any reference to the time of life at which they occur. But mental operations differ greatly in different periods of life, owing to what we call the growth or development of capacity. We have now to consider this far-reaching process of mental growth. We shall seek to distinguish between the successive stages of mental life and point out how these are related one to the other. By so doing we may hope to account not merely for the single operations of a faculty, but for the mature faculty itself viewed as the result of a process of growth. This part of our subject constitutes the theory of Mental Development.

Growth and Development. When speaking of the physical organism we distinguish between growth and development. The former is mere increase of size or bulk ; the latter consists of structural changes (increase of complexity). While growth and development usually run on together, there is no proper parallelism between them. Thus in abnormal growth development is hindered. And an organ as the brain may develop long after it has ceased to grow. It is possible to apply this analogy to mind. We may say that mind grows when it increases its stock of materials. It develops in so far as its materials are elaborated into higher and more complex forms. Mere growth of mind would thus be illustrated by an increase in the bulk of mental retentions, that is, in the contents of memory: development, by the ordering of these contents in their relations of difference and likeness, and so on. But the analogy cannot be pressed very far.

Characteristics of Development. In order to see how the later stages of growth differ from the earlier, let us compare the intellectual operations of a man with those of a child. *(a)* We observe first of all that in the former case the operations are more numerous and various. In the course of a day a man goes through many more processes of observing, judging, and so on, than a child. *(b)* Secondly, we observe that in general the operations exhibit a greater degree of perfection. Thus the observations of the man are more discriminating and accurate, and effected more easily and rapidly. *(c)* Thirdly, it is noticeable that the operations of the adult are as a whole more complex, consisting of longer and more intricate processes than those of the child. Thus he performs elaborate processes of abstract thinking which have no place among childish operations.

Development of Single Faculty and of Sum of Faculties. This aggregate of changes which constitutes the growth of mind appears to resolve itself into two parts. On the one hand we see that the several faculties which operate in the case of the child have expanded and increased in vigour. On the other hand we notice that new faculties, the germs of which are hardly discoverable in the child, have acquired strength. We see, that is to say, that while the faculties have each grown singly, there has been a certain order of unfolding among them, so that some have reached mature vigour before others.

Much the same thing is observable in the development of the other sides of mind, feeling and will. Here too we notice a great increase in the number and complexity of the phenomena. The emotions, resolutions and actions of a man are both more varied and more composite in their nature than those of a child. And further, we see that the several emotional capacities and active powers have been strengthened, while there has been a successive unfolding of higher and higher capacities and powers.

Growth of Separate Faculties. We may now confine ourselves to the intellectual side of mind, and view the development of it under each of the two aspects just distinguished, the development of the several faculties singly, and that of the sum of faculties.

The growth or improvement of a faculty includes three things, or may be regarded under three aspects. (1) Old operations become increasingly easy and rapid, requiring less stimulus, less effort of attention, and so on. Thus the recognition of one and the same kind of object, the recalling of the same impression, tends to become easier with the repetition of the operation. This is improvement of a faculty in a definite direction. (2) New operations of a similar grade of complexity will also grow easier. Thus the improvement of the observing powers (perception) includes a growing facility in noting and recognising unfamiliar objects: that of memory includes a greater readiness in retaining and recalling new impressions. This is improvement of a faculty generally. (3) This general improvement is completed by the attainment of the capability of executing more complex, intricate, and difficult operations. The growth of observation means the progressive capability of noting less conspicuous objects, of detecting finer differences between objects, and of grasping more complex and intricate wholes—that is to say, objects and groups of objects made up of more parts or details. Similarly, the growth of memory means the progress of the capability as shown in retaining and recalling less striking impressions and larger and more complex groups of impressions.

Development of Sum of Faculties. In the second place, we may view the development of the mind as a whole through successive stages corresponding to the several faculties. This is known as the order of development of the faculties. There is a well-marked order in the growth of intellect. (1) The process of attaining knowledge sets out with Sensation, or the reception of external impressions by the mind. Sense supplies the materials which the intellect assimilates and elaborates according to its own laws. Before we can know anything about the material objects which surround us they must impress our mind through the senses (sight, touch, hearing, &c.). (2) Sensation is followed by Perception, in which a number of impressions are grouped together under the form of a percept, or an immediate apprehension of some thing or object, as when we see and recognise an orange or a bell. (3) After Perception comes Representative Imagination, in which the mind pictures, or has an image of, what has been perceived. It may represent this either in the original form (Reproductive Imagination), as when we recall the face of a friend; or in a new form (Constructive Imagination), as when we imagine some historical personage. (4) Finally, we have General or Abstract Knowing, otherwise marked off as Thinking. This includes Conception, or the formation of Concepts or general Notions out of percepts and images, such as 'metal,' 'organism,' 'life,' and so on; Judgment, or the combination of Concepts, as when we assert that no men are omniscient; and Reasoning, or the combination of Judgments, as when we conclude that a particular writer, say a newspaper correspondent, is not omniscient, because no men are so.

A glance at this order will show that the later operations are marked by increasing complexity. Thus Perception is more complex than Sensation since it arises by an aggregation of sensations. Again, Conception is more complex than Imagination since concepts are formed out of a number of mental images. Similarly Judgment is more complex than Conception, and Reasoning than Judgment.

We must distinguish between psychological and logical simplicity. A percept is psychologically less complex than a concept because it is the element out of which the latter is composed. On the other hand, our knowledge of generalities, of classes and their abstract properties (as man, the human form, human intelligence), is logically more simple than our knowledge of concrete individual things, with all their numerous peculiarities (as James Smith, John Brown). General knowledge simplifies by 'abstracting,' *i.e.*, leaving individual differences out of account.

With this growth in complexity is intimately associated another feature of this series of changes, viz., increase in inwardness, or aloofness from external sense. Cognition begins with outer sense-impressions and ends in the inner processes of abstract thought. This aspect of development is described by saying that the movement of growth is from the presentative, or what is directly presented to the mind through sense, to the representative, what is indirectly set before the mind under the form of mental images or notions.

It is evident, further, that this transition from the presentative to the representative implies a growth in the *generality* of knowledge. All presentative knowledge is of the individual. In representation, however, we are able to take many individuals together and think of them as a class. The progress of knowledge is thus from the individual to the general, or from the concrete to the abstract.

Since the faculties each grow singly, and at the same time unfold themselves in a certain order, we see that the growth or development of a mind consists in a series of parallel movements, certain of which begin later than the others. Just as the growth of a plant consists of unfoldings of leaf, petal, and so on, some parts of the organism being in advance of others, but the progress of the earlier continuing after that of the later has begun, so the growth of a mind is at once a succession and a contemporaneous group of changes.[1]

[1] On the order of intellectual development, viewed as taking place in the history of the race, see Mr. Spencer's *Principles of Psychology*, Vol. II., Pt. VIII., Ch. II. and III.

Unity of Intellectual Development. It has already been pointed out that modern psychology seeks to reduce the several operations of Perception, Imagination, &c., to certain fundamental processes, of which discrimination and assimilation are the most important (see p. 26). If this is so it may be possible to regard the successive unfoldings of the faculties as one continuous process. The higher and more complex operations of thought would thus appear as only different modes of the same fundamental functions of intellect as underlie the lower and simpler operations of sense-perception. In other words, our distinction between the development of a single faculty and the development of the sum of faculties would be seen to be a superficial one only.

Now a little reflection will show that we can view the development of intellect as a whole in this way. Thus the simplest germ of knowing in sensation involves the discrimination of an impression; and the highest form of knowing, abstract thinking, is a higher manifestation of the same power. Again, the perception of a single object is a process of assimilating present to past impressions; and abstract thinking is assimilating or classing many objects under certain common aspects. We may thus say that the several stages of knowing, perception, conception, and so on, illustrate the same fundamental activities of intellect employed about more and more complex materials (sensations, percepts, ideas, &c.).

Growth and Exercise of Faculty. We have just seen how each faculty progresses or improves, and how the successive unfolding of the several faculties may be viewed as only a continuous growth of the same fundamental capabilities or functions. We have now to inquire into the meaning of this complex process of growth, in other words, into the principles or laws which underlie and determine it.

The most obvious of these principles or laws is that all intellectual growth results from the exercise of faculty or function. In other words, the faculties or functions are strengthened by exercise. Let us take the case of a single faculty first. The power of observation (perception), of detecting differences among colours, forms, and so on, improves by the repeated exercise of this power. Each successive operation tends to improve the faculty. Immediately it tends to improve it in a particular direction only. Thus if the power of observation is exercised with respect to colours, it will be strengthened more especially in this direction, but not to the same extent in other directions, *e.g.*, with respect to forms.

Let us now look at the development of intellect as a whole. Since perception, conception, and so on, are only different modes of the same intellectual functions, the exercise of these in the lower form prepares the way for the higher manifestations. This truth is recognised in the common saying that in training the senses we are laying the foundations of the higher intellectual culture. But this is not all. No amount of exercise of the observing powers will secure a full development of the powers of abstract thought. In order that the successive phases of intelligence may unfold themselves in due order, the separate exercise of the fundamental functions in each of these phases is necessary.

What Exercise of Intellect involves: Sense-Materials. The exercise of the intellectual powers as a whole may be roughly described as the employment of the fundamental functions upon the materials supplied by the Senses (Sensations, Sense-impressions). As we have seen, sensation is the elementary phase of the intellectual life. The senses supply the pabulum or nutriment which the intellect assimilates or elaborates according to its proper laws. The highest manifestations of intellect, abstract thought and reasoning, illustrate this dependence of intellectual activity on the elements, materials, or 'data' of sense. The growth of intellect by repeated exercise thus implies a continual supply of sense-materials, a multiplication of sense-impressions, to be worked up into intellectual products.

Retentiveness. In the second place, it is plain that this growth of intellect by exercise implies retentiveness. By this term is meant generally, that every operation of mind leaves a *trace* behind it which constitutes a *disposition* to perform the same operation or same kind of operation again. This truth obviously underlies the generalisation, 'Exercise strengthens faculty'. The increased power of discriminating colours, sounds, and so on, due to repeated exercises of the discriminative function, can only be accounted for by saying that each successive activity modifies the mind, strengthening its tendency to act on that particular side or in that particular mode.

Growth and Habit. This persistence of traces, and formation of a disposition to think, feel, &c., in the same way as before underlies what we call habit. By this term is meant a fixed tendency to think, feel, or act in a particular way under special circumstances. The formation of habits is a very important ingredient of what we mean by intellectual development; but it is not all that is so meant. Habit refers rather to the fixing of mental operations in particular directions. Taken in this narrow sense, habit is in a manner opposed to growth. By following out a train of ideas again and again in a certain way, we lose the capability of varying this order, of re-adapting the combination to new circumstances. Habit is thus the element of persistence, of custom, the *conservative* tendency; whereas growth implies flexibility, modifiability, susceptibility to new impressions, the *progressive* tendency. We shall again and again have to distinguish between the effect of habit as understood in this narrow sense, and development in the full sense, as a wide or many-sided progress.

In order that the intellectual powers as a whole may be exercised and grow, a higher form of retentiveness is needed. The traces left by intellectual activities must accumulate and appear under the form of revivals or reproductions. The impressions of sense when discriminated are in this way recalled as images. This retention and revival of the products of the early sense-discrimination is clearly necessary to the higher operations of thought. Images, though the product of elementary processes of discrimination and assimilation, supply in their turn the material for the more elaborate processes of thought. We thus see that the growing complexity of the intellectual life depends on the accumulation of innumerable traces of past and simpler products of intellectual activity.

Grouping of Parts: Laws of Association. One other law or principle involved in this process of intellectual development has to be touched on. The growth of intellect by repeated exercise of its functions leads to an increasing complexity of the products. This means that the several elements are combined or grouped in certain ways. This grouping goes on according to the Laws of Association. These laws will be fully discussed by and by. Here it is enough to say that the main law runs somewhat as follows: Two or more mental phenomena which have occurred together tend to recur together. The building up of perceptions out of sensations, of trains of images, of judgments (combinations of conceptions or ideas) and so on, all illustrate this process of combining.

To assimilate two distinct impressions or ideas is clearly a mode of intellectual combination. Moreover according to the common doctrine of association similarity constitutes a distinct tie or binding element. The exact relation between association of impressions (or ideas) contiguous in time, and the so-called association of like impressions (or ideas) will be discussed by and by. Here the special object has been to bring out the forces, tendencies, or laws which underlie and determine intellectual growth, the fundamental functions (discrimination and assimilation) being assumed.[1]

Whether this combining of elements which the law of (contiguous) association formulates should itself be regarded as a third intellectual function, may be left an open question. It is plainly connected very closely with retentiveness under the form of re-presentation. We combine two psychical elements A and B, only so far as we represent them. And the order of representation illustrates the law of combination (law of association). Hence on the whole it seems more convenient to take it up along with the general property of retentiveness as an essential ingredient or factor in the process of development. Regarded in this light, grouping is the condition of the more elaborate processes of intellect.

The reader who wishes to go further into the rationale of psychical development may compare the above rough account of the process with Mr. Spencer's theory. He regards the essential factors in the process to be (1) differentiation or separation of unlike parts; and (2) integration, by which he means classing like parts together. Integration appears to include the results of grouping as just described. It is the classing

[1] It is a point of some difficulty whether all processes of combination of psychical elements are properly included under the term 'association'. Wundt proposes for the combination of sensations in space-intuitions the term synthesis.

not of detached impressions or ideas, but of impressions and ideas in their relations of contiguity to other impressions and ideas.[1]

Summary of Process of Development. Let us now try to gather up as succinctly as possible the results of our analysis of the process of intellectual development. To begin with the Senses, these supply the materials, and call into play the functions of discrimination and assimilation. This early stage of intellectual activity involves only a rudimentary form of retentiveness, namely in the traces of past sensations blending with present and like ones. The repeated conjunction of certain impressions leads to the grouping of these in complex aggregates of a particular kind (Perception). This involves a distinct germ of representation. Later, through the cumulation of many traces of impressions and perceptions, the formation of images becomes possible (Imagination, including Memory). Finally, through the multiplication of images and their connections, and the strengthening of the functions of discrimination and assimilation (aided by the growth of the power of voluntary attention), the process of forming concepts of classes, and combinations of such concepts, becomes possible (Thought).

Development of Feeling and Willing. While for the sake of simplicity we have confined our attention to the development of intellect, it is necessary to add that the same features and the same underlying principles are discoverable in the growth of feeling and will. The earlier feelings (bodily pleasures and pains)

[1] See *First Principles*, Chap. XV., § 127; *Principles of Psychology*, Vol. I. Pt. III., Chap. X.

are simple and closely connected with the senses: the higher feelings (emotions) are complex and representative in character. Again the first actions (bodily movements) are simple and external, being immediate responses to sense-impressions, whereas the later are complex, internal and representative (choosing, resolving, &c.). It will be found further that there is a continuity of process throughout the development of each. And the same laws or conditions, growth by exercise, retentiveness and association, are illustrated here as in the case of intellectual development.

Interdependence of Intellectual, Emotional, and Active Development. We have so far viewed the growth of intellect, of feeling, and of volition as processes going on apart, independently of one another. And this is in a measure a correct assumption. It must however be remembered that mind is an organic unity, and that the processes of knowing, feeling and willing in a measure involve one another (see before, p. 22). It follows from this that the developments of these phases of mind will be closely connected. Thus, intellectual development presupposes a certain measure of emotional and volitional development. There would be no attainments in knowledge if the connected interests (curiosity, love of knowledge) and active impulses (concentration, application) had not been developed. Similarly there can be no development of the life of feeling without a considerable accumulation of knowledges about nature and man, nor can there be any development of action without a development of feeling and the accumulation of a store of practical knowledge. The mind may develop much more on one side than on the others, but development on one side without any development on the others is an impossibility.

This connectedness of one side of development with the others may be illustrated in the close dependence of intellectual growth on the exercise and improvement of the power of Attention. As has been remarked, attention though related to the active or volitional side of mind, is a general ingredient or condition of intellectual operations; and this being so its growth is implied in the growth of intellect. It is the improvement of this capability which makes successively possible accurate observation, steady reproduction, and all that we mean by thinking.

This dependence of one phase of mental development on the other phases is not however equally close in all cases. Thus the growth of knowing involves comparatively little of the emotional and volitional element. The growth of feeling in its higher forms involves considerable intellectual development, but no corresponding degree of volitional development. Finally the growth of will is largely dependent on that of knowing and feeling. Hence in the order of exposition we set out with the development of knowing, passing then to that of feeling, and finally to that of willing.

Psychical and Physical Development. Just as in studying mental operations at a particular time we have to include in our view nervous concomitants, so in studying mental development we must ask what changes in the nervous organism, and more particularly in the brain-centres, accompany these psychical changes.

Growth and Development of Brain. The brain like all other parts of the organism *grows* in bulk or size, and *develops* or manifests certain changes in its formation or structure. The two processes, growth and development, do not progress with the same degree of rapidity. The size nearly attains its maximum about the end of the 7th year, whereas the degree of structural development reached at this time is not much above that of the embryonic condition.[1]

By increase of structural development is here meant greater unlikeness of the several parts, or a higher degree of 'differentiation'; also a higher degree of intricacy of arrangement which seems to be best definable as the formation of special connections between part and part.

Order of Development of Brain-organs. There is a further order of development noticeable. The higher structures known as the cerebral hemispheres seem to develop later than the lower structures (basal ganglia, &c.). These higher structures appear to have greater complexity, that is to say, to involve more intricate arrangements among themselves and with other structures, than the lower brain centres.

Brain Development and Exercise. The brain being an organ closely connected with the rest of the bodily organism would tend to grow to a certain extent with the growth of the organism as a whole and independently of any activity of its own. But such growth would be rudimentary only. Like all other organs it

[1] See Bastian, *The Brain as an Organ of Mind*, p. 375.

grows and develops by exercise. This physiological law is clearly the counterpart of the psychological law that exercise strengthens faculty.

This increase of brain power through exercise implies two things. (1) All brain-activity reacts on the particular structure engaged, modifying it in some unknown way and bringing about a subsequent 'physiological disposition' to act in a similar manner. The most striking manifestation of this effect is seen when a man who has lost his sight is able to picture visible objects. The brain is now able to act *independently* of external stimulation, having acquired a disposition so to act through previous exercises *under* external stimulation.

(2) In the second place we have to assume that different parts of the brain which are exercised together acquire in some way a disposition to conjoint action. This fact has been expressed by Mr. Herbert Spencer by saying that 'lines of least resistance' are gradually formed for nervous action by the repeated flow of nerve energy in certain definite directions.

This rough sketch of brain development may suffice to indicate a certain parallelism between the processes of psychical and physical development. There is a growing complexity of cerebral structure and action answering to the growing complexity of the mental life, and there is good reason to suppose that the structures which attain their development late are connected with the higher and later activities of mind (thinking, deliberating, &c.). How far this parallelism extends is, however, a doubtful point. Whether for example it is possible as yet to find a physiological counterpart or equivalent for what we call association, seems uncertain. However this be we must be careful not to press this parallelism into a final explanation of psychical products. Thus from a mere consideration of the gradual differentiation of the cerebral nerve-substance we could not deduce the laws of development of intellectual activity, the discrimination of impressions, &c.

Mr. Spencer seeks to identify the psychical and physical processes to the utmost by resolving them both into the results of continual differentiations and integrations. But since psychical integration appears to mean assimilating or classing it is a little difficult to recognise any real identity or equivalence between the physiological and the mental process here called by the same name.

Mental Development as Adjustment to Surroundings.

So far we have been regarding the growth of an individual mind as a process apart, having no relation to anything beyond it, save the accompanying nervous changes. But this double process of psychical and nervous development may be viewed as related to certain external agencies. Let us first look at the relation of these external agencies to the mental process.

We have seen that the materials of the intellectual life are supplied by the senses. Sense-impressions clearly depend on the action of certain external agents, bodies emitting sound, reflecting light, and so on. Further the order of the physical agencies in time and space will determine the order of our perceptions, and resulting images and thoughts. Thus the fact that in our sense-experience a peal of thunder follows a flash of lightning, serves to determine the connection between our images of these events, and between our scientific conceptions of them. Similarly with respect to the space order. The relative position of two countries, of two stars, and so on determines the particular way of mentally picturing and thinking about them. To this extent, then, the order of our mental processes follows, and is conditioned or determined by, the order of external facts or events.

It follows further that all growth of knowledge means an increasing adaptation or harmonising of the internal to the external order. With growth of representative power the mind takes in remote relations of events or things in time and space, the succession of the seasons, the coexistence of remote parts of the earth's surface and so on. And the transition from particular representation or imagination to general representation or thought involves the adjustment of the intellectual processes to large groups or classes of external facts.

What is true of the growth of knowing is true of that of feeling and of willing. Feeling gradually adjusts itself to external surroundings. Things or persons beneficial to the individual come (as a rule) to be objects of pleasurable feeling or liking: those injurious to him come to be objects of dislike. The higher and more representative feelings such as patriotism, the sense of justice, and so on, involve adjustments to more numerous and extended external relations. Lastly, knowing and feeling lead on to acting. And in action we have the final outcome of the process of adjustment. In acting we seek what is beneficial and avoid what is injurious. In this way we react on our surroundings and so promote the harmonious adjustment of inner to outer relations. All growth of will illustrates an increasing adaptation to the facts and circumstances of life. Prudent conduct differs from hasty impulsive conduct in the fact that it involves a representation of remote as well as near results, of permanent as distinguished from temporary circumstances of life.

Interaction of Environment and Nervous Organism. Let us now look at the other part of this process of adaptation, the adjustment of the nerve-structures to external circumstances. It is plain that external things act upon the mind through the medium of the nervous organism. The physical agencies, the vibrations known as light, sound, and so on, act upon the appropriate nerve structures calling forth reactions which are accompanied by psychical states. Through innumerable interactions between the nervous system and the environment the former becomes gradually modified in conformity with the latter. Thus nervous connections are built up in the brain-centres corresponding to external relations. The nervous structures are thus in a manner moulded in agreement to the external order, to the form or structure of the environment.

While the development of the nervous structures and of the psychical activities related to these may thus be viewed as conditioned by the external order, we must be careful not to fall into the error of supposing that we have to do here with a simple case of mechanical effects analogous to the effect of the action of one body on another in the environment. The development of the nervous structures, though conditioned by external arrangements, follows the proper laws of organic and nervous development. That is to say it is much more than a mere effect of the external actions. Much more is this true of the psychical process. Although in a way attached to the process of nervous development and so amenable to the action of external forces, it cannot be understood as an indirect complex effect of such action. Mental development is something altogether different in kind from physical development and can only be understood by means of its own laws. Thus retentiveness, the great underlying principle of this process, is something which has only a remote analogue in the region of organic processes. The revival of a past impression may be somehow correlated with the fact of a physiological modification in the nerve structures concerned, but though conditioned by this physical fact or circumstance it is something altogether different from it, something that could never have been discovered or even divined by considering it.[1]

Internal and External Factor in Development. Taking this view of mental development as a process related to and conditioned by the action of the environment, we may say that the growth of an individual mind is brought about by the co-operation of two sets of agencies or factors. Of these the first is the Internal Factor. By this is meant the mind itself with its several capabilities considered as original or primordial, not susceptible of being resolved into anything simpler. With this must be taken the nervous organism with which mental activity is somehow connected. The second is the External Factor. By this is meant the surroundings or the environment which acts upon the mind in connection with the nervous structures.

Internal Factor. This consists first of all of the simple and fundamental capabilities of the mind. It includes the several ultimately distinguishable modes of sensibility to light, sound, and so on. Further it embraces the fundamental intellectual functions, discrimination, and assimilation. In like manner it will include the primary or fundamental capacities of feeling, and powers of willing. To these must be added the property of retentiveness itself, which as we have seen underlies what we mean by mental growth. These several capabilities must be assumed as present

[1] For a full exposition of the process of development as a growing adaptation to surroundings the reader is referred to Mr. H. Spencer's *Principles of Psychology*, Vol. I., Part III., *General Synthesis*. The processes of nervous adaptation are more especially dealt with in Part V., *Physical Synthesis*.

from the first. They are original properties of the mind which cannot be further analysed or accounted for.

Inherited Dispositions. In addition to these common fundamental capabilities of mind, the internal factor probably contains a more special element. This is known by the name of inherited tendencies or dispositions to think, feel, and act, in particular ways. An alleged example of such a tendency is the disposition to think of events as related one to another by way of causation, or as causes and effects.

We must clearly understand what is meant by an inherited mental tendency. In the first place it implies that the tendency has not been acquired in the course of the individual life or experience. Thus when we talk of an inherited disposition to think in conformity with the law of cause and effect, we mean that a child's mind is to some extent determined to think in this way independently of the teaching of his experience. This part of the meaning would be expressed by saying that the tendency was 'instinctive,' 'innate,' or better perhaps, 'connate'.[1] In addition to this the term 'inherited' implies a *positive* fact, namely that the mental tendency has been handed down to the individual from his progenitors or ancestors in connection with certain features of the nervous structures. Now the common mental capabilities, the power of discriminating and so on, may be said to be thus handed down or transmitted from parent to

[1] The term innate as commonly employed seems to imply that the tendency should show itself at the beginning of life: but this as we shall see presently is not necessary. Hence the word connate is preferable.

child. When, however, we talk of inherited mental tendencies something more is implied. We mean that the transmitted tendency is a result of ancestral experience, that it represents an acquisition made in the course of the history of the race. Thus the instinctive tendency to connect events according to the relation of cause and effect is regarded as the transmitted product of the uniform or approximately uniform experience of many generations. That is to say men have found from the time that they began to observe nature that events occur in a certain connection, that every event is preceded by some other event or events.

It is important to add that these inherited tendencies need not manifest themselves at the beginning of life. Some amount of individual experience may be necessary to the manifestation of the inherited bent of mind. More than this, it is supposed that there is a general agreement between the order of development of the individual and that of the race, and that the date of the appearance of an inherited tendency will answer roughly to the period of the history of the race in which the acquisition was made. Thus the earlier acquisitions of the race will be represented by tendencies which manifest themselves at the beginning of the individual life: the later acquisitions by tendencies which appear at later stages of the individual life.

It is a much disputed question how far such inherited dispositions extend. In the region of intellect we have as probable examples, the tendency to connect touch and sight experiences in the visual perception of objects, the tendency to group events under the relation of cause and effect, and so on. In the region of feeling inheritance seems to play a still more extensive part. The pleasurable feeling called forth in the infant mind by the sight of the mother's face, the painful feeling evoked by the looks and tones of anger and rebuke, the fear manifested by young children at the sight of strangers, and certain animals, are illustrations of such inherited emotional tendencies. Such feelings seem to answer to numerous pleasurable or painful experiences of the race. Finally in the region of action we find apparent tendencies in the individual to fall in with the customary or habitual ways of action of his ancestors. Thus the infant tends instinctively and apart from the teaching of experience to move his eyes symmetrically, to stretch out his hand to seize an object, and to carry objects to his mouth and so on.

Into the full meaning of the principle of heredity as applied by the Evolutionist to the development of the individual physically and psychically, it is not necessary to enter now. Two points may be just touched on.

(a) Owing to the principle of hereditary transmission the psychical development of the individual follows and is in a measure conditioned by that of the race. That is to say the nerve-centres and the corresponding psychical activities tend to unfold in the order in which they have been developed in the history of the race. There is thus a parallelism between the shorter and the longer process of development. In each case the order of intellectual development has been from knowledge of concrete facts or particulars to that of general or abstract truths.

(b) It follows from the Evolutionist's doctrine that in a progressive race the native capabilities of each new generation show a slight advance on those of preceding ones. The improvement of faculty attained by each generation tends to transmit itself in the shape of an original or connate increment of capability. Thus the capabilities of a child now

born of European parents would be higher than those of a child of a low and backward race.[1]

External Factor. In the second place the development of an individual mind implies the presence and co-operation of the External Factor, or the Environment. By this we mean in the first place the physical environment or natural surroundings. The growth of intellect feeling and will is as we have seen conditioned by the action of the several physical agencies, by the form and arrangement of things making up our natural habitat. The contents and the order of arrangement of the environment thus help to determine the form of our mental life.

The Social Environment. In addition to what we commonly call the Natural or Physical Environment there is the Social Environment. By this we mean the society of which the individual is a member, with which he holds certain relations, and by which he is profoundly influenced. The Social Medium, like the Physical, affects the individual mind through sense-impressions (sights and sounds); yet its action differs from that of the natural surroundings in being a *moral* influence. It works through the forces which bind man to man, such as imitation, sympathy, and the sentiment of obedience or authority.

The presence of a social medium is necessary to a full normal development of mind. If it were possible

[1] This idea of a gradually increasing native capability is essentially a modern one, being a prominent feature of the theory of Evolution. Locke and the older psychologists argued as if all minds, whatever the stage of civilisation reached, were equally endowed at birth. For a fuller exposition of the laws of heredity the reader is referred to Mr. Spencer's *Principles of Biology*, Part II., Chap. VIII., and M. Ribot's volume *On Heredity*.

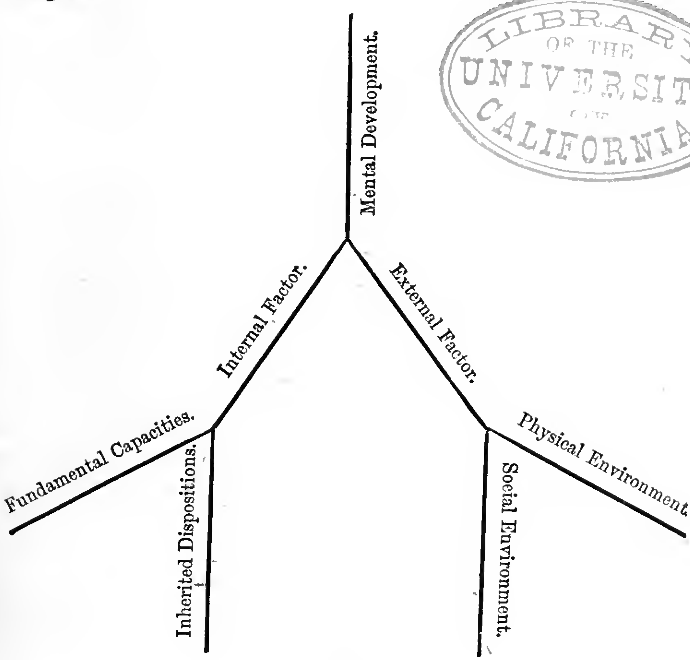
to maintain a child in bodily health and at the same time deprive him of all companionship, his mental development would be but rudimentary. The child comes under the stimulation, the guidance, and the control of others, and these influences are essential to a normal mental development. Thus his intellectual growth is determined by continual contact and interaction with the social intelligence, the body of knowledge amassed by the race, and expressed in everyday speech, in books, &c. Similarly the feelings of the child quicken and grow under the touch of social sentiment. And finally his will is called forth, stimulated and guided by the habitual modes of action of those about him.

These social influences embrace a wider area as life progresses. Beginning with the action of the family they go on expanding by including the influences of the school, of companions, and finally of the whole community as working through manners, public opinion, and so forth.

Undesigned and Designed Influence of Society. A part of this social influence acts undesignedly, that is without any intention to accomplish a result. The effects of contact of mind with mind, of example, of the prevailing tone of a family or a society, all this resembles the action of natural or physical agencies. On the other hand a considerable remainder of this influence is clearly designed. To this part belong all the mechanism of instruction, the arts of suasion, moral and legal control, &c.

Both kinds of social influence co-operate in each of the three great phases of mental development. Thus the intellect of a child grows partly under the influence of contact with the social intelligence reflecting itself in the structure of language; and partly by the aid of systematic instruction. Similarly feeling develops partly through the mere contact with other minds, or the agencies of sympathy, and partly by direct appeals from others. Finally the will develops partly by the attraction of example and the impulses of imitation, and partly by the forces of suasion, advice, reproof, and the whole system of social discipline.

Scheme of Development. The reader may perhaps be able the better to comprehend the above rough theory of mental development by help of the following diagram.



Since all these factors must co-operate in some measure in bringing about what we call the normal development of an individual mind, we cannot separate this complex effect into parts, referring one part to one factor, another part to another factor. Still by observing the variations in the effect which attend variations in any particular factor we may form a rough idea respecting the comparative value of each of the cooperant conditions. This question of comparative value arises more especially with respect to the Social Factor. Psychologists as a rule have paid but little attention to the influence of the social surroundings on the growth of the individual mind. Yet it is now commonly acknowledged that this is an essential condition of a full normal development. As to the extent of its influence, however, there is still room for wide differences of opinion.[1]

This question has a peculiar interest in connection with the problem of race-development. In a progressive community the social environment improves in quality with each succeeding generation. All the forces of intellectual, emotional and volitional stimulation are increased. Through the accumulation of more exact knowledge handed down in books and by oral instruction, through the influences of gentler manners, a more refined type of life, and a higher moral standard of conduct, and lastly through the improvement in the products of human industry, the useful and the fine arts, laws, and so on, each new generation comes under a far more powerful social influence. And it must always be a difficult question to decide how far the intellectual and moral progress of a race can be accounted for by this *traditional* heightening of the social environment, and how far it involves as well a *hereditary* heightening of native capability.

[1] The importance of the Social Environment has been emphasised by the late G. H. Lewes. See *Problems of Life and Mind*, First Series, Vol. I., p. 152 *seq.*; and *The Study of Psychology*, Chap. IV.

Varieties of Development. While all minds pass through the same typical normal course of development, there are endless differences in the details of the mental history of individuals. In no two cases is the process of mental growth precisely similar. These diversities of mental history answer to the differences between mind and mind spoken of in the previous chapter. Such differences of development may be referred to one of two causes or factors: (*a*) variations or inequalities of original capacity, or (*b*) differences in the external circumstances physical and social. All differences in the final result, that is the mature or developed aptitude, must be assignable to one (or both) of these factors.

It is important to observe that differences of original capacity include all inequalities in capability of development, or susceptibility to improvement. Individuals vary greatly in respect of the effect of any given amount of stimulation or exercise of faculty. Practice improves capacity much more uniformly and rapidly in some cases than in others. As every teacher knows the processes of education applied to two children at approximately the same level of attainment result in widely unlike amounts of progress. Such inequalities in capability of mental growth (connected in part with different degrees of retentiveness) constitute some of the most striking among the original or inherent differences of aptitude among individuals.

Differences of Original Capacity. These must be estimated in the same way as differences of mature capacity. The difficulty here is to determine what is strictly original and not in any measure the result of previous training or other kind of external influence. Yet though we cannot altogether eliminate the effect of early influences we can reduce it to a minimum by taking the child soon enough, or by selecting for our experiment a sufficiently new mode of mental operation.

Individual Nature. Such a method of comparative measurement applied to young children would undoubtedly confirm the everyday observation of parents and teachers alike that children are at birth endowed with very unequal degrees of capacity of different kinds. Each individual has his particular proportion of aptitudes and tendencies, which constitutes his *nature* or his natural, as distinguished from his later and partly acquired character. This natural character is doubtless very closely connected with the peculiar make of his bodily and more particularly his nervous organism. The condition of the sense-organs, of the brain, of the muscular system, and even of the lower vital organs, all serves to determine what we call the native idiosyncrasy or temperament of the individual.

Special Heredity. It is common to say that these characteristics of the individual mind are determined to some extent by heredity. Thus the members of one race or nationality, as the French, have certain inherited mental as well as physical traits in common. Still more plainly the members of one family are observed to have a certain mental as well as a bodily character in common. The play of heredity is seen in a still more restricted form in the occasional transmission of a definite kind of talent through generations of a given family, as for example of musical talent in the Bach family.[1]

Yet with the influence of heredity there goes another principle which we may call the tendency to individual variation. Variations up to the point of marked contrast occur in the same family. Such contrasts may sometimes be only another illustration of the action of heredity, being what is known as a reversion to some earlier type of mental character. But this cannot be safely maintained in the majority of instances. In the present stage of our knowledge of the subject heredity only helps us to account for a comparatively few among the host of peculiarities which go to make up the natural basis of an individual character.

Varieties of External Influence. The older psychology of Locke and his followers overlooked the effects of individual 'nature'. Modern writers are perhaps more liable to overlook the effects of 'nurture'. While accepting all that can be proved by observation respecting the strength and persistence of original peculiarities of nature or temperament, we must insist on the supplementary truth that differences in the surroundings, physical and still more social, have a good deal to do with the differences of ability and disposition that we find among individuals.

The important thing to bear in mind here is that no two individuals ever come under the same influences. Even twins have an unlike social environment

[1] For fuller illustrations of such transmission of definite ability see Mr. F. Galton's work, *Hereditary Genius: c.f.*, Prof. Th. Ribot's volume, *On Heredity.*

from the first. Their own mother is hardly likely to feel towards them, or to treat them in quite the same way; and others show this divergence of feeling and behaviour very much more. As life progresses the sum of external influences serving to differentiate individual character increases. The school, the place of business, the circle of friends, and so on, all help to give a peculiar stamp to the individual mind.

That even such slight differences in surroundings must produce an effect follows from psychological laws. The mind grows on what it assimilates. The lines of its growth will be to some extent pre-determined by innate capabilities and tendencies; but these only broadly limit the process, they do not fix its precise character. The particular ideas and connections of ideas formed, the intellectual habits fixed, the peculiar colouring of the feelings, and the special lines of the conduct will all be determined by the character of the surroundings.[1]

Training of the Faculties. The subject of training is closely connected with the action of the social environment. All education or training is indeed the designed influence of society on the individual concentrated and reduced to a systematic form. The

[1] The importance of original differences of intellectual aptitude and emotional disposition has just been insisted on with great force of argument by Mr. F. Galton in his curious volume, *Inquiries into Human Faculty and its development.* See *Nurture and Nature*, p. 177, &c. An illustration of the strength and pertinacity of original tendencies is very clearly brought out in the *History of Twins*, p. 216 *seq.* Mr. Galton takes cases of twins who were much alike and also of twins who were distinctly unlike, and he seeks to show that in both cases the final result is largely determined by nature and not by nurture. Careful as the observation and the reasoning undoubtedly are here, it is possible that Mr. Galton hardly does justice to all the far-reaching influences of unlike early impressions.

training of a faculty means the regular calling of it into activity by supplying the conditions of its exercise. This includes first of all the presentment of suitable materials. The powers of observation, of memory, and so on, can only be called into activity by supplying materials, such as objects to be inspected, words to be committed to memory. To this must be added the application of a social stimulus in the shape of a motive to intellectual effort (concentration of mind), such as a promise of favour, or a threat of punishment.

Such training must clearly be based on a knowledge of the laws of mental development. Thus it has to conform to the great law of all growth that it is appropriate exercise which strengthens faculty. That is to say it will aim directly at calling forth a faculty into its proper mode of action by supplying materials and motives adapted to the stage of development reached at the time. And here it may be well to say that there should be an adequate but not excessive stimulation of the faculty. By adequate stimulation is meant an excitation of sufficient strength and variety to secure completeness of growth. By excessive stimulation is meant an amount of excitation which forces the activity to such a point as is unfavourable to growth.

In the second place the whole scheme of training should conform to the natural order of development of the faculties. Those faculties which develop first must be exercised first. It is vain, for example, to try to cultivate the power of abstraction before the powers of observation (perception) and imagination have reached a certain degree of strength. This self-evident proposition is one of the best accepted principles in the modern theory of Education, though there is reason to apprehend that it is still frequently violated in practice.

Writers on pædagogics have sought to divide early life into periods distinguished by the predominance of certain faculties. Thus Beneke recognises four periods: (1) To about the end of the 3rd year, the period of sense and instinct in which the child is mainly engrossed with external things: (2) To about the end of the 7th year, in which internal mental activity comes up to and balances external activity (sense-perception): (3) To the end of the 14th year, in which inner activity becomes free of sense and gains a distinct ascendency over this: and (4) To the end of school life, in which the higher mental powers (thought) appear in fuller development. It is obvious however that all such demarcations must be rough and inexact. The process of development is at once too continuous and too complex to allow of such sharp divisions, though it may be of great practical value to adopt them as rough contrivances.

Once more, a method of training based on scientific principles will aim not only at taking up a faculty at the right moment, but also at cultivating it up to the proper point, and not beyond this. By this point is meant the level which answers to its rank or value in the whole scale of faculties. Thus for example in training the memory or the imagination we should inquire into its precise importance in relation to the attainment of knowledge and intellectual culture as a whole, and give to its exercise and development a proportionate amount of attention.

Finally training in order to be adequate must be to some extent elastic adapting itself to the numerous differences among young minds. Up to a certain point a common result, namely a typical completeness of development, will be aimed at. It would not be well for example that any child however unimaginative should have his imagination wholly untrained. At the same time this typical plan of cultivation must be modified in detail. The greater the natural aptitude, the more economical the production of a given psychical result. Hence it would be wasteful to give as much time and thought to the training of a bad as of a good germ of faculty. Nor do the practical ends of life impose such a disagreeable task on the teacher. Variety of individual development answers to the highly elaborated division of life-work which characterises civilisation.

APPENDIX.

For a fuller account of the nature and causes of mental development the reader is referred to Mr. Spencer's *Principles of Psychology*, especially Vol. I., Parts III. and IV. A brief statement of the characteristics of development as bearing on the work of the teacher will be found in Mr. Spencer's Essay, *Education*, Chap. II. The subject has also been discussed from an educational point of view by Beneke, *Erziehungslehre*, I., p. 101, &c., and by G. F. Pfisterer, *Pædagogische Psychologie*, § 2.

CHAPTER IV.

ATTENTION.

As we have seen, attention, though closely related to the active side of the mind and illustrating the laws of volition, is a general condition of our mental operations. We must therefore understand something about this mode of activity and its laws at the outset.

Definition of Attention. Attention may be roughly defined as the active self-direction of the mind to any object which presents itself to it at the moment.[1] It is somewhat the same as the mind's 'consciousness' of what is present to it. The field of Consciousness however is wider than that of Attention. Consciousness admits of many degrees of distinctness. I may be very vaguely or indistinctly conscious of some bodily sensation, of some haunting recollection, and so on. To attend is to intensify consciousness by concentrating or narrowing it on some definite and restricted area. It is to force the mind or consciousness in a particular direction so as to make the objects as distinct as possible.

[1] The idea of activity and effort is directly suggested by the etymology of the word, *ad tendere*, to stretch (sc. the mind) towards.

Unconscious Psychical Activity. The question of the exact nature and range of those regions of psychical life to which we do not attend has given rise to much discussion. This domain has been variously called the unconscious, sub-conscious, or obscure region of mental phenomena. Is there a sphere of unconscious psychical activity out of all relation to our state of consciousness at the time? For example, do the impressions which we experienced years ago and which we are capable of reviving under particular circumstances exist now in this unconscious region? If we attempt to account for psychical phenomena solely by means of psychical processes, we seem almost compelled to resort to these 'unconscious operations'.[1] At the same time, there are obvious difficulties in this view. Thus it is said that to talk of a *mental* phenomenon existing out of relation to our conscious life is a contradiction.

This difficulty is reduced if not removed by saying that there are degrees of consciousness; that in addition to the region of our distinct conscious life there is a vast region of the sub-conscious or faintly conscious. This domain consists of all those psychical elements which enter into and colour the conscious state of the time, but which are not discriminated or distinguished. Thus there is at any one time a whole mass of organic sensation, the outcome or concomitant of the activity of the several organs of digestion, &c., which affects our state of mind (depressing or exalting), but which is not disentangled and resolved into its elements.

Two main questions arise as to the limits of this sub-conscious region. (1) How far does it extend in relation to the organism and its processes? Do all organic processes modify it in some way? (2) To what extent is it modified by past psychical activities? Do things long forgotten yet capable of being revived somehow affect the whole state of mind in the interval? Without troubling ourselves about this difficult question we may say that at any time there is a whole aggregate or complex of mental phenomena, sensations, impressions, thoughts, &c., most of which are obscure, transitory, and not distinguished. With this wide obscure region of the sub-conscious, there stands contrasted the narrow luminous region of the clearly conscious. An impression or thought must be presumed to be already present in the first or sub-conscious region before the mind by an effort of attention can draw it into the second region. To adopt the metaphor of Wundt, the whole mental region (conscious and sub-conscious) answers to the total field of view present to the eye in varying degrees of distinctness at any moment when the organ is fixed in a certain direction; the latter region, that

[1] If on the other hand we seek to explain psychical processes by help of nervous processes we may regard the hypothesis of unconscious mental activity as unnecessary.

of attention or clear consciousness, corresponds to that narrow area of 'perfect vision' on which the glance is fixed. [On the hypothesis of unconscious mental activity and of the relations of the region of attention to that of consciousness as a whole, see Sir W. Hamilton *Lectures on Metaphysics*, Vol. I., Lect. XVIII. (*cf.* J. S. Mill's *Examination of Sir W. Hamilton's Philosophy*, Chap. XV.); G. H. Lewes, *Physical Basis of Mind*, Prob. III., Ch. IV.; Wundt, *Physiol. Psychologie*, Vol. II., 4er Abschnitt, 15es Cap., 1, 2; Brentano, *Psychologie*, 2es Buch, 2es Cap.]

As an active tension of mind attention is opposed to that relaxed state of mind in which there is no effort to fix itself on any particular object. Such a state may be called one of diffuse consciousness.[1]

Objects of Attention. The phenomena of intellect emotion and will may alike become directly or indirectly objects of attention. The most conspicuous class of objects is that of external impressions, the sights, sounds, &c., which make up objects of sense.[2] When the teacher talks about 'attending' he commonly means actively listening, or actively looking. In addition to external impressions and objects, internal images, ideas and thoughts, may be attended to. Feelings of pleasure and pain if not directly attended to, are so indirectly, through the fixing of the attention on the exciting cause of the feeling, whether an external object or an internal image. Finally we attend to our actions when we fix our minds closely on what we are about and more particularly on the result which we are immediately aiming at.

[1] If the expression is preferred it may be called scattered attention, but I think it best to reserve the term attention for the more palpable exertions of mental activity in definite directions.

[2] The reader will see presently that external impressions and objects differ from one another. Here they are alike spoken of as 'objects of attention'.

Effects of Attention. An act of attention serves to give greater force, vividness, and distinctness to its object. Thus an impression of sound becomes more forcible or impressive, and further has its character made more definite, when we direct our attention to it. A feeling of pleasure or pain is manifestly intensified when we attend to it, or its cause or conditions. A serious bodily injury may hardly trouble our mind, if through some exceptional excitement we are incapable of attending to it. Thus a soldier wounded in battle has sometimes hardly felt any pain at the moment. On the other hand a very moderate sensation of discomfort, as an irritation of the skin, grows into something intensely disagreeable if the attention is fastened on the particular bodily locality affected. Finally our actions are vigorous and precise in proportion to the amount of attention we give to them.[1]

Attention and Intellectual Operations. We may say then that attention enters as a constituent into all classes of mental operation, and this cooperation of attention is specially conspicuous in the case of *intellectual* operations. The objects which present themselves to our senses are only clearly discriminated one from the other, and classed as objects of such and such a class, when we attend to them. So again present impressions only exercise their full force in calling up what is associated with them when we keep them before the mind by an act of attention.

[1] For fuller illustrations of these effects, see Dr. Carpenter's *Mental Physiology*, Chap. III. The German reader may compare Fechner, *Elemente der Psychophysik*, II., p. 452 *seq.*; Lotze, *Medecinische Psychologie*, § 432; Stumpf, *Tonpsychologie*, § 4, p. 71, &c.

Once more, all thinking is clearly an active state of mind involving a voluntary fixing of the attention. We thus see that attention though a form of action or will, stands in the closest relation to the intellectual processes. It may be described as the function of will in relation to knowing, the cooperation of the active side of mind in aiding, directing, and controlling the mechanism of intellect. This being so it is desirable to single it out for consideration before entering on the exposition of intellect.

Nervous Concomitants of Attention. The fact that attention is an act of the mind would suggest that its nervous concomitants are certain processes in those motor centres which we know to be more especially concerned in movement or action. This conjecture is borne out by the fact that the act of attention is commonly accompanied by muscular contractions. Among these are the muscular actions which subserve the intellectual operation, such as the fixing of the eye on an object or the turning of the ear in the direction of a sound. In addition to these there are other actions which constitute the characteristic expression of attention. Attention is commonly accompanied by a fixing of the eyes, head, and whole body; and this fixity is maintained by an act of will. In very close attention, as in trying to recall something, there are other bodily accompaniments such as the compression of the lips, frowning, and so on. Finally, in all close attention there is a feeling of tension or strain which appears to indicate muscular effort. As Fechner says, in looking steadfastly this feeling is referred to the eye, in listening closely, to the ear, in trying to 'think' or recollect, to the head or brain.[1]

All this seems to imply that when we attend to an impression there goes forth a nerve-impulse from some of the higher motor centres in the brain. In order to adjust this physiological hypothesis to the facts of the intensification of sense-impressions (and representations of these) by attention, we have to suppose that this current of nervous discharge has two branches, one flowing outward to the muscles, the other inward to the sensory centres which are specially concerned in the impression of the moment. Thus it is presumable that when we attend to a visible object a stream of energy flows downwards from the motor centres, partly in the direction of the muscles, and more particularly the ocular

[1] *Elemente der Psycho-physik.*, II., pp. 475, 476.

muscles which move the eye: and partly in that of the sensory centre which is concerned in the reception of visual impressions.[1]

Extent of Attention Attention has already been defined as a focussing of the mind for a given point, a concentrating of its activity from a diffused inattentive condition. All attention is thus in a measure concentration. But two acts of attention may have unequal extent of object. Thus in looking at a picture I may attend now to some small detail, now to the whole composition of the picture. So in listening to music I may single out a particular note, or direct my attention to the ensemble of notes making up a chord.

It has been argued that strictly speaking we never attend to more than one thing at the same instant and that when we seem to do so our attention really flits rapidly from one object to another. This seems clearly to be so in the case of disconnected objects, as when we try to listen to a conversation and write a letter at the same time. When however we attend to a number of *connected* impressions, parts of an object, or a collection of objects, such as a number of figures in a group, we seem capable of grasping the whole by an approximately simultaneous act of attention.[2]

Relation of Extent to Force or Intensity. There is a very important relation between the extent or area of object that we try to attend to at one moment and the effective force of the act. This relation may

[1] See Wundt, *Physiol. Psychol.*, II., 15es Cap., 2, pp. 209, 210.

[2] On the question how many objects the attention can embrace at one time see Sir W. Hamilton's *Lectures on Metaphysics*, XIII., XIV.

be expressed as follows: When an equal effort is made, the effective force of an act of attention varies inversely as the extent of object attended to. "Pluribus intentus, minor est ad singula sensus." In other words, the more we comprehend or embrace in the act of attention the less penetrating will it be. The closest and most fruitful attention therefore implies the maximum of concentration.

On what the degree of Attention depends. The amount of attention exerted at any time depends on two chief circumstances (*a*) the quantity of active energy disposable at the time; (*b*) the strength of the stimulus or force which excites the attention or rouses it to action. If there is great active energy a feeble stimulus will suffice to bring about attention. The healthy vigorous child in the early part of the day has a superabundance of energy which shows itself in attention to small and comparatively uninteresting matters. On the other hand a tired or weakly child requires a proportionately powerful stimulus.[1]

External and Internal Stimuli. The stimulus to an act of attention may be either something external connected with the object attended to, or something internal. An external stimulus consists of some interesting or striking feature in the object itself or in its accompaniments, by reason of which the attention is said to be attracted and arrested, such as the brilliance of a light, or the strangeness of a sound. An internal stimulus is a motive in the mind which

[1] On the conditions of attention see Lotze, *Med. Psychologie*, §§ 428, 429; Stumpf, *Tonpsychologie*, § 4, p. 68, &c.

prompts it to put forth its attention in a particular direction, such as the desire of a child to please his teacher, or to gain a higher place in his class.

Non-voluntary and Voluntary Attention. When the mind is acted upon by the mere force of the object presented, the act of attention is said to be non-voluntary.[1] It may also be called reflex (or automatic) because it bears a striking analogy to reflex movement, that is to say, movement following sensory stimulation without the intervention of a conscious purpose. On the other hand when we attend to a thing under the impulse of a desire, such as curiosity or a wish to know about a thing, we are said to do so by an act of will, or voluntarily. These two modes of attention are very properly distinguished. As we shall see presently, we frequently mean by voluntary attention a direct opposition to the non-voluntary kind. The distinction is useful further as marking off roughly the earlier and later stage in the development of attention. In early life non-voluntary attention is predominant, in later life voluntary attention. Yet a moment's consideration will tell us that they are not absolutely distinct. They are both *acts* of the mind and have certain common conditions, some of which have just been enumerated. And they will be found to blend and to shade off one into the other in our actual mental life.[2]

Laws of Reflex Attention. As we have seen, the

[1] The term non-voluntary is preferred to involuntary as indicating the mere absence of volition, and not opposition to will or 'unwillingness'.

[2] The relation between the two forms of attention is clearly defined by Wundt (*Physiol. Psychologie*, Vol. II., Csp. XV., p. 211).

force of attention at any time depends in part on the vigour of body and mind and in part on the strength of the stimulus. Now (within the limits of fatigue already indicated) healthy children are characterised by a considerable degree of activity, bodily and mental. As we shall see later on they do things 'spontaneously' or under the force of very slight stimuli. And the same remark applies to the activity of attention. Young children spontaneously observe things, and evidently find pleasure in venting their energies in this way. This being so, the nature of the particular stimulus present produces an effect chiefly in determining the *direction* of the attention at any time. We have to enquire into the precise characters of the stimulus which make it potent or attractive. A knowledge of these will supply us with what may be called laws of reflex attention. Since moreover voluntary attention is always conditioned or limited by the conditions of reflex attention, these laws may be said to be laws of attention as a whole.

Quantity of Stimulus. In the first place, then, it is evident that the attractive force of a stimulus will vary as its quantity, and more particularly its degree, that is to say the intensity of the impression or the vividness of the mental image.[1] Thus a bright colour is a more potent stimulus than a dull one, a vivid mental image than a faint one. One reason why it is easier in general to attend to external impressions than to internal mental images is that the former are more vivid.

[1] As we shall see presently, this holds good within certain limits only. If a stimulus is very powerful the attention may be unable to adjust itself to it, and so be overpowered.

Quantity of stimulus must be taken to include not merely the degree, but also the duration of the stimulus, and the extent or size of the object. A feeble stimulus, such as the faint sound of a tapping at the door, may attract attention when prolonged for a certain time. One reason why it is difficult to attend to mental images is that they are often so fugitive. Similarly a large object in a scene, such as the moving shadow of a cloud, is more likely to attract the attention than a very small and inconspicuous one.[1]

Quality of Stimulus. The attractive force of a stimulus is determined not simply by its quantity but also by its quality, by its agreeable, disagreeable, or indifferent character. Agreeable objects, that is to say, those which immediately yield pleasure to the mind, such as beautiful colours or graceful forms, are as such fitted to arrest the attention. Powerful stimuli, such as a bright light or a loud sound (if not fatiguing) are as a rule pleasant. But the pleasure resulting from a stimulus may not be connected with its mere strength. A soft note, if very sweet, may act as a powerful attraction. The pleasure again may be reflected on to the object by association. Children's attention is powerfully riveted by the signs of coming pleasure, by objects which excite hope and pleasurable anticipation. It is not, however, merely agreeable or pleasant objects which arrest the attention. The opposite kind of effect, though less common, perhaps, deserves to be mentioned. Any object which excites terror, horror, and so on, acts as a powerful stimulus to

[1] A fuller discussion of the quantitative aspects of sense-impressions, will be found later on.

the attention with children as well as with adults. In contradistinction to these, indifferent objects, that is to say, those which affect the mind neither pleasurably nor painfully, commonly fail to arrest the attention.

The fact that a distinctly painful sight, such as that of a wounded man, can fascinate the attention, suggests that all impressions and thoughts having any accompaniment of feeling or 'emotional tone,' whether pleasurable or painful, are on that account more potent stimuli to the attention. It appears, indeed, as if such an accompaniment of feeling gave greater persistence and awakening force to the stimulus. We all know the teasing effect of some disagreeable recollection, as that we ought to be keeping some engagement at the moment. From the principle of *reflex* attention we must distinguish the law of *voluntary* attention, that the mind seeks to retain before it what is pleasurable, and to banish what is painful.

Attention and Interest. The word 'interest' may be used in a wide sense as including the effect of impressions generally in rousing the attention. In this sense the familiar saying, 'we attend to what interests us,' is a perfectly tautological expression. More usually the term refers to the rousing effect of an object through the medium of feeling. We are interested in a thing when we are affected by it either pleasurably or painfully. In the first case we call our interest a pleasurable one, in the second, a painful one. In a peculiar manner those things are interesting to us, or awaken our interest, which answer to, or are connected with, our particular sensibilities, tastes, and related habits of thought. Thus a conceited person is specially interested in any talk, flattering or otherwise, about himself; a person with artistic taste is specially interested in objects of beauty, and so on. The objects which interest a person thus serve as an index or clue to his customary and dominant feelings and tastes. While, however, anything which touches us on the side of feeling, whether pleasantly or unpleasantly, is said to be interesting, the term interest usually refers more particularly to the attractive force of pleasurable impressions.

This special reference of the word 'interest' to what is pleasurable points to the superior importance of voluntary attention, and to the fact that reflex attention easily passes into the higher form. A thing which fully interests us excites the will to a deliberate concentration of the attention with a view either to prolong or gain some pleasure or satisfaction, or to get rid of or avert some pain. And since the positive end of voluntary action is pleasure or happiness, the term interest naturally comes to point to those objects and related activities which are immediate sources of enjoyment, or which are connected with, or have a bearing on, these. Our 'interests,' such as our home, business, country, favourite art, are the great and permanent sources of our happiness.

Absolute and Relative Impressiveness. The quantity and quality of an object, as just defined, may be said to make up its *absolute impressiveness.* From this may be distinguished its *relative impressiveness,* that is to say the force which it owes to its relation to other objects which have preceded it, and to the pre-existing condition of the attention.

Change of Stimulus. Any stimulus will exert a greater effect on the attention in proportion as the degree of change introduced into the mental state of the moment increases. All change, contrast, or transition of mind from one state to another acts as a kind of rousing shock. The sudden introduction of a sound into the stillness of a country retreat acts as a potent stimulus to the attention. Similarly a succession of very dissimilar sounds, as that of a thin shrill voice on those of a deep rich one, is certain to arouse the attention. Moving objects, especially if the movement has a certain degree of rapidity, are powerful stimuli because they involve a continual change of stimulation. The more sudden the change, the greater the awakening effect.

The other side of this truth is seen in the fact that one and the same stimulus if prolonged loses its force, and soon ceases to exert any effect on the attention. The new picture or piece of furniture, which on its introduction excited the liveliest attention, soon takes its place among the familiar and unnoticed objects of our environment.

Change of Impression and Mental Life. It has been said by Hobbes and others that continual change of impression is necessary to mental life. We are only conscious of an impression (*e.g.*, a sound) when we pass to it from an unlike impression. An unvarying sound does not affect us at all.[1] This is to some extent a consequence of the laws of our nervous organism. The nervous structures grow fatigued after prolonged activity, and this shows itself in diminished vigour of mental operation. It seems to be still more directly connected with the laws of attention. A certain frequency of transition from one object to another is a condition of mental *wakefulness*. The attention of a healthy and vigorous child is continually changing its direction. The introduction of a fresh object into the room, the giving forth of a fresh sound at once carries off its attention.

[1] Hobbes said to feel always the same thing and not to feel at all comes to the same thing. Professor Bain calls this principle of change the *Law of Relativity*. See his *Senses and Intellect*, Introduction, Chap. I., 6.

Effect of Novelty. The amount of change involved in a stimulus may be estimated in relation not merely to the preceding stimulus, but to a number of past impressions. This determines the degree of novelty or unfamiliarity of the stimulus. What is oft recurring and familiar, as for example the stroke of a clock, produces little effect on the attention. A sound much less powerful than that of a good-sized clock, provided it were of a wholly unfamiliar sort, would certainly arrest the attention.

Familiarity and Interest. While it is thus certain that novel sights and sounds, as such, strike the attention momentarily, it does not follow that mere novelty will succeed in holding the mind. As Volkmann observes, the absolutely new does not chain the attention. In order to effect this result an object must possess, over and above the superficial quality of novelty, the deeper attribute of interestingness. Now, as we have seen, a thing interests us when it touches our feelings, and this it can only do by linking itself on somehow to our recurring and habitual trains of imagery and thought. A good part of our interest in things (more particularly our intellectual interest) is connected with the fact of their intelligibility. To one who knows nothing of mechanics the complicated movements of a machine are apt to be a tedious spectacle. We see with interest and enjoyment what we are prepared to see by previous experience and knowledge. Hence the very circumstance of familiarity will sometimes constitute a source of interest. If, for example, we happen to overhear a person speak in an unknown language and suddenly catch a familiar English word, our attention is instantly excited.[1]

Adjustment of Attention. What has been said above respecting the effect of change or contrast on attention must be qualified by a reference to another set of conditions. If impressions or thoughts succeed one another at a very rapid rate the attention is unable to fix itself on each member of the series.[2] Again when any sudden and powerful impression occurs we experience a momentary confusion. The attention is overpowered, and a short period is necessary for its recuperation. These and other facts go to show that there is a process of accommodation or adjustment of attention to its objects, which process occupies a certain time. Only when this process of adjustment is completed does an impression or idea become distinct in consciousness.

On what Facility of Adjustment depends. The time required for this adjustment is not the same in all cases. It depends partly on the character and more particularly the force or intensity of the object itself. Very powerful impressions in general require a greater effort of adjustment than moderate ones. Very feeble ones require a greater effort, too, but for another reason, namely in order to raise them above the limit of distinct consciousness. Hence impressions of moderate or average intensity are in general more easily or rapidly seized by the mind than those of very great or very little force.

[1] The relation of familiarity to interest is well brought out by Volkmann (*Lehrbuch der Psychologie*, Vol. II., pp. 199-200). He seems, however, to go too far when he defines interest as the relation of an impression or idea ("Vorstellung") to the ruling cluster or aggregate of ideas of the individual ("des Ich"). A natural phenomenon or a new saying will often interest us (intellectually) by its apparent contradiction of a known truth, exciting in our minds an intense curiosity; and again, what is grotesque seems to interest us (æsthetically) by its incongruity with our customary modes of thought.

[2] When, however, the same fugitive impressions or thoughts recur at rapid intervals the attention is stimulated. We often catch ourselves hearing the second or third stroke of a clock, though we failed to hear the first. Similarly a thought (*e.g.*, the recollection that we ought to be going somewhere) may pass fugitively through the mind again and again without exciting attention, but at last arrest notice by its insistance. This may be explained in a variety of ways. It is possible (1) that the repetition of a sound, such as the tapping at the door, greatly increases the chance of a coincidence between a disengaged state of the attention and the presence of the stimulus; or (2) that by an accumulation of the traces of the successive sounds the stimulus gains in force; or (3) that it allows of a series of partial adjustments of the attention which (by accumulation) terminate in a complete adjustment.

In the second place the time of adjustment is affected by the preceding state and direction of activity of the attention. In a state of lethargy or inattentiveness, a greater force of stimulus is needed to arouse the attention. This is illustrated in all somnolent states of mind. Again preoccupation of mind is unfavourable to attention. When the attention is directed into a particular quarter A, a greater effort is needed to direct it into a new quarter B.

On the other hand the process of adjustment of attention to an impression or thought may be greatly aided by the preceding mode of activity of the attention. A state of mental wakefulness is favourable to attention generally. After attending to a number of sights or sounds the mind is more or less on the alert for new impressions. Not only so the special direction of attention at any moment may favour the adjustment of it at the next moment. In other words the direction of attention to an object A will under certain circumstances facilitate the direction of it to a second object B. In order that this should happen there must be a certain relation between A and B.

Continuity or Smoothness of transition. These circumstances may be roughly divided into two relations: (*a*) similarity between A and B; and (*b*) connectedness between them. By connectedness is here meant that A and B have previously followed one another. When either of these circumstances is present in a marked degree we have the peculiar effect of a smooth transition of mind, or a continuous flow of impressions or thoughts. Let us look at the action of each of these circumstances apart.

Effect of Similarity. To begin with after throwing the attention into any region of impression or experience, there is a tendency to go on attending in the same direction. When occupied with sight, as in scanning the features of a landscape, our attention is more easily excited by a new visual impression (*e.g.*, the flight of a bird) than by one of another order, as a sound or smell. Similarly after carrying on a train of internal thought for some time the attention tends to persist in this line. A new idea will then engage the attention more readily than a new external impression.[1]

When the similarity becomes more marked the effect on adjustment is still more apparent. If two successive impressions or two thoughts A and B are partially like, the preceding adjustment to A facilitates the adjustment to B. In this way smoothness of transition is given to the movement from A to B. Instances of this effect may be found

[1] This has been shown in an interesting way by experiment. Wundt found that the attention to a sound-signal was disturbed less by a homogeneous impression, as a noise, than by a heterogeneous one, as a visual impression. *Physiologische Psychologie*, Vol. II., Cap. 16, § 2, p. 244.

in the rapidity with which we can turn the attention from any one word, musical note, or face, to another.[1]

Again when there is no similarity in the quality of the impressions, their resemblance in the time of recurrence greatly aids the process of adjustment, and gives smoothness of transition. Hence the peculiar effect of all regular sequences of sounds, visible movements, the measure and rhythm of verse, melody, and dance. Such periodic recurrences exactly answer to the conditions of ready and easy adjustment. The mind in this case falls into the way of adjusting itself at regularly recurring intervals.[2]

Connection between Impressions. Let us now glance at the second great circumstance favourable to smoothness of transition. The movement of the attention from one impression to another is greatly aided by previous successions of the two. Thus we can transfer attention easily and rapidly from one note of a familiar tune, or one movement of a familiar dance, to the succeeding member of the series. The fact that B has frequently followed A before, prepares the mind for the reception of B when A again presents itself. Attention adjusts itself easily in this case because it moves along the accustomed path A—B.[3]

Expectant Attention. When the adjustment of attention completes itself before the presentation of the impression, it may be said to be pre-adjusted. This is illustrated in what we call anticipation or expectation. Whenever the mind is able to look onward and anticipate a coming impression the attention accommodates itself beforehand. The consequence is, as has been proved by experiment, a shortening of the process of reception and recognition. This expectation may be of different degrees of perfection. Thus we may know only the time of the impression, but not its nature. In listening to a new poem or a new musical composition we anticipate the succeeding sounds in their regular recurrence. This anticipation of a new impression (or series of impressions) after a regular interval is a condition of the pleasurable effect of an orderly rhythmic sequence of sounds or sights. The mind not only adjusts itself to each new impression but has a continual satisfaction of nascent expectation.

[1] The peculiar effect of gradation in colours, &c., illustrates this effect of smoothness at its maximum.

[2] Not all regular successions are equally favourable to adjustment. The attention adjusts itself to a moderate sequence more easily than to a very rapid one, or to a very slow one.

[3] The reader will notice that the three conditions of attention now specified, change or contrast, similarity, and connectedness, answer to the presumably fundamental modes of intellectual activity, discrimination, assimilation, and grouping or synthesis. This fact brings out the radical unity of intellect and attention.

Expectation, in the ordinary sense, involves an anticipation of the nature or quality, and not merely of the point of time of the impression. This again may be of various degrees of distinctness or completeness. I may have a vague anticipation of the words a person will utter on a particular occasion, *e.g.*, in response to a toast. Such indefinite anticipation facilitates the reception of an impression. In other cases the mind may be able to distinctly forecast what is coming. Thus I may distinctly anticipate an event, as the sound of a gun after seeing the smoke. When this anticipation of the precise quality of an impression is supplemented by the prevision of the point of time of its appearance, the preparation or preadjustment of attention may be said to be perfect.[1]

It is to be added that this preadjustment of attention, like the completed act of attention itself, may have its stimulus or excitant in some feature of the object, or in some motive in the mind. In looking forward to an exciting event, such as the upward rush of a rocket, or the outburst of sound from an orchestra, our minds are kept strung in the attitude of expectancy by the exciting character of the mental image. On the other hand, when a child at the beginning of a class lesson puts himself in an attitude of expectancy in order to avoid censure, or from some other similar motive, he may be said to perform a voluntary act of preadjustment.

[1] The effects of such preadjustment of attention on the rapidity of the process of perception have been measured by a number of physiologists. The method consists in estimating by a delicate chronometric apparatus the interval between the occurrence of the stimulation of a sense organ and that of a volitional reaction. The person experimented on receives a signal, *e.g.*, hears a sound, at a particular moment which can be estimated with great exactness, and then records by a movement of the hand the precise moment of the impression. The whole period between the happening of the sensory stimulation and the execution of the movement is known as the 'reaction time'. This time is divided into stages: (1) that occupied by the transference of the nervous excitation from the periphery to the centres; (2) that involved in the modification of consciousness; (3) that necessary to apperception or distinct apprehension by a direction of the attention; (4) that taken up by the volitional process; and finally (5) that required for the propagation of the motor excitation from the centres to the muscles. By varying the external conditions, as by letting the subject know, or leaving him in ignorance of, the quality of the impression, or the exact time of its occurrence, or both, this period is modified. Every circumstance aiding the preadjustment of the attention shortens it, while every circumstance hindering this lengthens it. Hence the fluctuations are regarded as due to variations in the period of apperception. [For a fuller account of these experiments as given and interpreted by Wundt, see his *Physiologische Psychologie*, II., Cap. 16. I gave a brief account of them in *Mind*, Vol. I. (1876), pp. 36-42.]

Mechanism of Reflex Attention. Under ordinary circumstances the attention is solicited in a number of directions simultaneously. Provided there is the necessary activity of mind, the attention will be drawn in a direction determined by the foregoing considerations. Speaking roughly one may describe what takes place as a sort of struggle for existence among stimuli, in which the greatest, the most interesting, or the most novel survives. At the same time each survival is but momentary, it being of the very nature of reflex attention to be easily drawn off by new stimuli.

Intervention of Will: Voluntary Attention. By the intervention of the will, the comparatively simple mechanism here described is greatly modified. Volition supplements the forces of reflex attention by other forces, so complicating the whole process. It supplies *internal* motives which may counteract the effect of *external* stimuli. Through an exertion of will the mind is able to choose the quarter to which to direct its glance, and is no longer at the mercy of the most powerful external forces. If reflex attention is likened to the process of natural selection, voluntary attention may be likened to the process of artificial selection, by which man's will is able to single out particular varieties of animal or plant for his own special purposes.

Function of the Will in Attention. It is important to understand the precise scope of the will's action in attention. What is called voluntary attention is not a wholly new phase of the process. After the action of the will has supervened the forces of non-voluntary attention continue to be active as *tendencies.* And the range of the will's action is limited by these. Thus the student most practised in abstraction could not resist the allurement of a beautiful melody sung within his hearing.

Again, though we can undoubtedly (within certain limits) *direct* our attention in this or that quarter at will, we have not the power to keep our attention closely fixed on any object which we (or somebody else for us) may happen to select.[1] Something further is necessary to that lively interaction of mind and object which we call a state of attention; and this is interest. By an act of will I may resolve to turn my attention to something, say a passage in a book. But if after this preliminary process of adjustment of the mental eye, the object opens up no interesting phase, all the willing in the world will not produce a calm settled state of concentration. The will introduces mind and object: it cannot force an attachment between them. No compulsion of a teacher ever succeeded in making a young mind cordially embrace and appropriate by an act of concentration an unsuitable, and therefore uninteresting subject. We thus see that voluntary attention is not removed from the sway of interest. What the will does is to determine the kind of interest which shall prevail at the moment. This is effected by the initial determination to bend the mind in this or that direction. After this first stage of determination the

[1] "Experience itself soon teaches us that it is not possible to concentrate our attention with any degree of strength we choose, on any object we choose." (Waitz, *Lehrbuch der Psychologie*, p. 639).

action of the will is (commonly) confined to keeping the attention fixed on an object which is found to yield a pleasurable interest.[1]

The interest which thus finally secures a prolonged attention may first disclose itself after the execution of the voluntary act. Thus a pupil upon fixing his attention on what seems at first an uninviting subject of study may find his thoughts gradually attracted and chained. In many cases the interest has its starting point in the very motive which underlies the voluntary act. When any object bears on some strongly desired end, it becomes, on that account, invested with an associated or reflected interest. By regarding it as a means to some object of desire we draw it for the time within the circle of interesting things. Thus a child who has reason to anticipate his parent's or teacher's commendation or disapproval takes a lively interest in the otherwise but little interesting movements of his features. But in order to the full realisation of this result, the relation of means to end must be a natural one, and not one artificially imposed. A school-boy hardly takes a (pleasurable) interest in a piece of task work just because the completion of it is seen to be a condition of enjoying some eagerly desired game.

Laws of Voluntary Attention. It has been remarked above that the degree of attention exerted in any case depends partly on the force of the stimulus, and

[1] Volkmann distinguishes between a *state* of attention (Aufmerksamkeit) and the voluntary *act* of attending (Aufmerken). In the so-called voluntary attention the state is preceded (and accompanied) by the act. (See *Lehrbuch der Psychologie*, Vol. II., p. 198).

partly on the vigour of mind and body at the time. In the case of voluntary attention the initial stimulus is some internal motive. We may say then that the stronger the motive brought to bear (the degree of active vigour being supposed to be unaltered), the more energetic (within certain limits) the act of attention. The child will be prepared to concentrate more activity of mind upon an object, such as the lesson he is getting up, when he has a powerful inducement to do so.

Effort of Attention. It must, however, be remembered that in voluntary attention the effective force of an act of attention, as measured by the added clearness and distinctness which it gives to the object, is not exactly proportionate to the quantity of active energy expended. Voluntary attention commonly involves, especially in its early stages, and before habit assists, an *effort*. Reflex attention is a natural and easy attitude, voluntary attention is by comparison an artificial and constrained one. The difficulty may be due to the nature of the object, *e.g.*, its faintness, or to the presence of obstructive solicitations in other directions. The overcoming of any such obstacle necessitates an effort which will be greater when there is fatigue or a falling off in vigour. The effective force of the act of attention is what remains over when the difficulty is overcome. Now an effort is something disagreeable, and consequently will only be faced when there is a proportionate strength of motive present. We see then that when the exertion of attention is difficult or laborious, a stronger force of motive must be brought to bear in order to secure the desired result.[1]

Growth of Attention: Early Stage. As has been observed the early form of attention is the reflex or non-voluntary. By frequent exercises of its activity in response to external stimuli the faculty of attention attains a certain degree of strength independently of any aid from the will. After a certain number of exercises, less powerful stimuli suffice, in the absence of more powerful ones, to call forth attention. Thus by directing his attention again and again to bright objects, as the candle, the infant is preparing to direct it (still non-voluntarily) to the mother's face, his hands, &c., when these objects happen to come into the field of view. With the progress of life, too, many things at first indifferent acquire an interest. Thus the accompaniments of what is intrinsically interesting would acquire (according to the principle of association) a borrowed or derived interest. In this way the infant tends to watch the preparation of his food and his bath; the boy comes to take an interest in the construction of his kite, and so on. Not only so, the range of interesting objects would be greatly extended by the development of new feelings, such as self-esteem, affection, and the sense of the grotesque.

Development of Power of Controlling the Attention. While this exercise of the power of attention in the

[1] Of course this process of overcoming difficulty has its limits. Mental exertions cannot, any more than bodily, exceed the available quantity of energy of the individual at the time. As this point is approached, a larger and larger increase of motive force seems to be necessary.

reflex form is thus going on, the child's will is developing. The transition from the earlier to the later process of attention may perhaps be found in the *continued* gazing at an agreeable object, such as a brightly coloured toy or picture, held before the eye. When the child finding that a thing gives it pleasure, begins to persist in the act of attention through a vague anticipation of further pleasure, he may be said to be exercising the germ of his voluntary power. A more distinctly marked development of will-power is manifested in the attitude of expectation. From a very early period of life the will begins to manifest itself in a deliberate exploring or looking out for objects.[1] By such successive exercises the activity of attention is little by little brought under perfect control. Although the full understanding of this process presupposes a knowledge of the growth of will as a whole, we may be able to anticipate to some extent, and indicate the main lines of this progress.

The growth of voluntary attention means a continual reduction of the difficulty of attending to objects. The law that exercise strengthens faculty applies to attention. What is first done with labour and sense of difficulty is, with repetition and practice, done more and more easily. At the same time more and more difficult tasks become possible. The growth of attention may be best treated by distinguishing

[1] Professor Preyer says that the child begins to explore the field of vision in search of objects before the end of the third month. (*Die Seele des Kindes*, p. 33). He puts the first appearance of volition, properly so called, a month or two later. This suggests that the simple action here spoken of is a transition from the reflex to the voluntary form of attention.

between the several forms in which this progressive mastery of difficulty manifests itself.

Attention to the Unimpressive. Voluntary attention is obviously a going beyond the range of powerful and directly interesting stimuli, and an embracing of a wider circle of comparatively unimpressive and only indirectly interesting objects. The progress of attention can be measured under this aspect. The child learns gradually to fix with his eye the less striking, prominent, and attractive objects and events of the world in which he lives. Each successive direction of the attention makes subsequent directions easier, and the growth of mind as a whole implies the constant addition of new motives to attention. In this way each of us gradually acquires the power of turning his attention at will in this or that direction as occasion arises. It must be remembered, however, that in every case this widening of the area of attention goes on *pari passu* with the expansion of our interests.

Of the motives or interests which aid in this expansion of the field of attention the widest in the range of its influence is the intellectual impulse of curiosity, or the desire to inspect and understand things. Under the influence of this motive the student of science learns to direct his attention to the most inconspicuous and fugitive of phenomena. When this curiosity is wide and impartial, embracing all kinds of subject-matter, we have the versatile mind, ever ready to turn its attention in a new and unexplored quarter.

Resistance to Stimuli. A voluntary control of the attention involves, in the second place, the ability to resist the solicitations of powerful stimuli. Voluntarily to turn the mind to a thing is to exclude what is irrelevant and distracting. This power of resistance has of course in every case its limits. Nobody can withstand the disturbing force of a sudden explosion. But the capability of resisting such distractions varies considerably, and is greatly improved by practice. The child finds it hard at first not to look out of the window when hearing a lesson. By and by he will be able to fix his mind on his lesson even when some amount of disturbing noise is present. The highest attainment of this power is seen in the student whose mind is not appreciably affected by external impressions, being directed inwardly in reflection on its own ideas. Here again a fairly accurate measure of attentive power may be obtained by noting the strength of stimulus, *e.g.*, disturbing sounds, which is overcome.

Keeping the Attention Fixed. Another aspect under which the growth of attention may be estimated is the ability to detain objects before the mind. As we have seen, reflex attention is for the most part a process of flitting from object to object. We found indeed that even here there is a force at work which tends to counteract the impulse to skip from one thing to another. But this would not of itself carry us very far. It is only as the attention comes under the control of the will that it shows any considerable measure of persistence. To attend to a thing voluntarily means commonly to *keep* the mind dwelling on it. Here again we have to recognise the existence of certain limits in every case. Nobody can fix his mind on one and the same object for an indefinite time.[1] When once the fresh interest of a thing is exhausted a further fixing of the attention costs more and more effort. When this stage is reached the mind soon wearies of the prolonged exertion, and attention flags in spite of the utmost effort. But the limit of fatigue is pushed further off as the will develops and the act of attention becomes more easy.

Concentration. The power of sustained attention grows with the ability to resist distractions and solicitations. The two capabilities are thus very closely connected with one another, and are both included in the term Concentration. To concentrate the mind is to fix it persistently on an object or group of objects, resolutely excluding from the mental view all irrelevant objects. The great field for the early exercises of such concentration is action. When the child wants to do something, as open a box, or build a pile of bricks, the strong desire for the end secures a prolonged effort of attention. The scholar patiently poring over a mutilated passage in an ancient MS., to the neglect of his appetite, or the naturalist patiently observing the movements of insects or of plants, indifferent to cold and wet, illustrates a high power of prolonged concentration. A person's power

[1] Strictly speaking, what is often called attending to one thing, is the following of a *series* of connected impressions or ideas, and involves a continual renewal and deepening of interest. This remark applies to such occupations as listening to, or reading a scientific exposition, witnessing a dramatic spectacle, and so on. And even a prolonged attention to a small material object, as a coin, or a flower, involves a continual transition of mind from one aspect to another, one set of suggestions to another. Hence it would be more correctly described as making the object the *centre* of attention, the point from which it sets out and to which it continually reverts.

of attention may be conveniently measured by the degree of persistence attained.

Concentration and Genius. It has often been said that great intellectual power turns on the ability to concentrate the attention. Newton based his intellectual superiority on this circumstance. Helvetius observed that genius is nothing but a continued attention.[1] A proposition about which there is so general an agreement among those who ought to know may be safely accepted as expressing a truth. Attention is a condition of all intellectual achievement, and a good power of prolonged concentration is undoubtedly indispensable to first-rate achievement in any direction. The discoverers of new knowledge have always been distinguished by an unusual degree of pertinacity in brooding over a subject, and in following out trains of thought in this and that direction till the required explanation of fact, reconciliation of apparent contradictions, and so on, was found. But though these sayings undoubtedly embody an important truth, they only contain a part of the whole truth. No amount of attention simply will constitute intellectual brilliance. This depends on the possession of the intellectual functions (discrimination, &c.) in an exceptionally perfect form. On the other hand good intellectual powers when aided by a comparatively small power of prolonged attention, may render their possessor quick and intelligent.

Grasp of Attention. It has already been remarked

[1] For similar utterances by other authorities, see Sir W. Hamilton's *Lectures on Metaphysics*, Vol. I., p. 256, &c. Among more recent eminent men, Faraday may be instanced as testifying to the same effect. Carlyle's deliverances on this head are too well known to need quotation.

that our power of simultaneous attention is exceedingly limited. If we try to embrace a number of objects in a glance of attention they are not clearly seized and apprehended. We may however pass the attention so rapidly over a number of details as to approximate to a simultaneous grasp of the whole. In this way the eye can take in the proportions of a building, and the ear take in the rhythmical successions of notes. The growth of voluntary attention includes an increase of power in this direction. A teacher learns to keep his eye on all members of his class, a *chef d'orchestre* his ears on all the different groups of instruments. The acquirement of certain arts, as playing the organ, implies a high degree of this power. In proportion as this power of taking in rapidly a number of facts or details grows, will the perceptions advance in complexity, and also the comparison of object with object, idea with idea, be facilitated.

Transition of Attention. Somewhat akin to the power of carrying the attention quickly over a number of connected details, is the capability of transferring it from one thing to another and disconnected thing. The growth of voluntary attention includes an increasing facility in turning the mind from one subject of study to another, or from one matter of business to another. Its highest form is seen in the rapid movements of the versatile mind. Another illustration of great facility in transference is seen in those swift alternations of attention which underlie what is roughly described as doing two things at once, as playing a piece of music or painting a picture and at the same time carrying on a conversation.

The special capability seems at first sight to imply two things, facility in dismissing an object from the mind, and in readjusting the attention in a new direction. But perhaps these are only two sides of one and the same capability. It may be said that we only completely expel a thing from the thoughts when we redirect them elsewhither. Rapid expulsion would thus appear to carry with it rapid readjustment.

Habits of Attention. Voluntary attention, like voluntary action as a whole, is perfected in the form of habits. By a habit we mean a fixed disposition to do a thing, and a facility in doing it, the result of numerous repetitions of the action. The growth of the power of attention may be viewed as a progressive formation of habits. At first voluntary concentration of mind requires a spur and an effort. As soon as the pressure of strong motive is withdrawn, the young mind returns to its natural state of listlessness or wandering attention. A habit of attention first appears as a recurring readiness to attend under definite circumstances, for example when the child goes into his class-room, or is addressed by somebody. Later on there manifests itself a more permanent attitude of attentiveness. The transition from childhood to youth is often characterised by the acquisition of a wider habit of mental watchfulness, showing itself in thoughtfulness about what is seen and heard. The highest result of the working of the principle o habit in this region is illustrated in the customary, and but rarely relaxed, alertness of mind of the diligent observer of nature.

Varieties of Attentive Power. It has been implied that the power of attention does not always develop equally on all sides. Through differences of native temperament, as well as through differences of exercise, we find well-marked contrasts of attentive power. And these help to a considerable extent to determine the cast or character of mind. Everybody knows the difference, for example, between the plodding child able to concentrate his mind on an object for a long period, but slow to transfer and adjust his attention to new matter, and the quick but rather superficial child who finds it easy to fix his attention on new objects, though hard to keep it fixed for a prolonged period. There are some who are capable of great intensity of concentration under favourable circumstances, but whose minds are easily overpowered by disturbing or distracting influences. A versatile mind, again, is marked by a power of throwing a great deal of force of attention into a matter in a short space of time, and of rapidly accommodating or adjusting its attention to new objects; but it is commonly wanting in the capability of prolonged application.[1] Finally, the ruling habits of attention will vary according to the character of the predominant interests. Thus, for example, a strong love of nature (whether scientific or artistic) will give a habitual outward bent to the attention; whereas a paramount interest in our own feelings, or in the objects of imagination and thought, will give a customary inward inclination to the attention.

Training of the Attention. All intellectual guidance of the young implies the power of holding their attention. Instruction

[1] On the nature of this quality, see Miss Edgeworth's *Essays on Practical Education*, I., pp. 140, &c.; also my paper on Versatility, in *Mind*, Vol. VII. (1882), p. 369.

may be said to begin when the mother can secure the attention of the infant to an object by pointing her finger to it. Henceforth she has the child's mental life to a certain extent under her control, and can select the impressions which shall give new knowledge or new enjoyment. What we mark off as formal teaching, whether by the presentation of external objects for inspection through the senses, or by verbal instruction, clearly involves at every stage an appeal to the attention, and depends for its success on securing this. To know how to exercise the attention, how to call forth its full activity is thus the first condition of success in education.

Mental Science here, as in respect of the other faculties, can only point out the general conditions to be observed and the natural order of procedure. It is plain in the first place that the laws of attention must be complied with. He would be a foolish teacher who gave a child a number of disconnected things to do at a time, or who insisted on keeping his mind bent on the same subject for an indefinite period. Yet though these conditions are obvious enough, others are more easily overlooked. Thus it is probable that a more exact knowledge of the effects on the attention of novelty of subject and mode of treatment, on the one hand, and of total unfamiliarity on the other hand, would save teachers from many errors. Some of us can recall from our school days the wearisome effect of an oft-recurring stereotyped illustration, as well as the impression of repellent strangeness produced by a first, and too sudden, introduction to a perfectly new branch of study.

In the second place it will be well to bear in mind that the young child's power of voluntary attention is rudimentary only, and that force must be economised by removing all obstacles and making the task as attractive and agreeable as possible. It would be idle to try to enlist his close attention if he were bodily fatigued, or if he were under the influence of emotional excitement and agitated in mind and body. Again it would be vain to expect him to listen to oral instruction close to a window looking out on a busy street. Children's (uncontrolled) attention flows outwards to the sights and sounds of the actual external world, and is less easily diverted by the teacher's words towards the world of imagination and thought. Consequently, in teaching, everything should be done to reduce the force of outward things. The teacher would do well to remember that even so practised a thinker as Kant found it helpful to prolonged meditation to fix his eye on a familiar and therefore unexciting object (a neighbouring church-spire). Not only so, the subject and mode of treatment chosen should be such as to attract the learner's attention to the utmost. What is fresh, interesting, or associated with some pleasurable interest, will secure and hold the attention when dry topics altogether fail to do so. Much may be done in this direction by preparation, by awakening curiosity, and by putting the child's mind in the attitude of tiptoe expectancy.

As the pupil grows more may of course be required in the shape of an effort to direct attention. It must never be forgotten, however, that all through life forced attention to what is wholly uninteresting is not only wearing, but is certain to be ineffectual and unproductive. Hence the rule to adapt the work to the growing intellectual and other likings of the child. Not only so, the teacher should regard it as an important part of the training of the attention to arouse interest, to deepen and fix it in certain definite directions, and gradually to enlarge its range.[1] Harder task-work, such as learning the comparatively uninteresting letters of the alphabet, or the notes of the musical scale, must be introduced gradually, and only when the will-power is sufficiently developed. Great care must be taken further to graduate the length or duration of the mental application both in a particular direction, and generally, in accordance with the progress of the child's powers of voluntary attention. An ideal school-system would exhibit all gradations in this respect; alternation and complete remission of mental activity being frequent at first, and growing less and less so as the powers of prolonged concentration develop.

APPENDIX.

For a fuller account of the nature of attention, see Sir W. Hamilton's *Lectures on Metaphysics*, Vol. I., Lect. XIV. ; also, Dr. Carpenter's *Mental Physiology*, Book I., Ch. III. The characteristics of children's attention,

[1] Volkmann remarks that the older pædagogic had as its rule, "Make your instruction interesting" ; whereas the newer has the precept, "Instruct in such a way that an interest may awake and remain active for life" *(Lehrbuch der Psychologie*, Vol. II., p. 200).

and the laws of the growth of attention, are well described by Waitz, *Lehrbuch der Psychologie*, § 55, and by Volkmann, *Lehrbuch der Psychologie*, Vol. II., § 114. The relations of attention to consciousness are dealt with by Fechner, *Elemente der Psychophysik*, Vol. II., Sect. XLI. and XLII. ; and by Wundt, *Grundzüge der physiologischen Psychologie*, 2nd Ed., Vol. II., 4th Sect., Ch. XV. and XVI.

On the training of the attention, see Locke, *Some Thoughts concerning Education*, § 167 ; Maria Edgeworth, *Essays on Practical Education*, Vol. I., Chap. II. Beneke, *Erziehungs und Unterrichtslehre*, 4th Ed., Vol. I., § 19 ; and Th. Waitz's *Allgemeine Pædagogik*. Vol. I., § 23.

CHAPTER V.

SENSATION.

All knowledge takes its rise in the senses. No intellectual work such as imagining or reasoning can be done till the senses have supplied the necessary materials. These materials when reduced to their elements are sensations or sense-impressions, such as those of light and colour which we receive by means of the eye, of sound which we have by way of the ear, and so on. An examination of our most abstract notions, such as force, matter, leads us back to these impressions. Our ideas can never go much beyond our sensations. The want of a sense, as in the case of one born blind, means depriving the mind of a whole order of ideas. The addition of a new sense, if such a thing were possible, would enrich our minds by a new kind of knowledge respecting the world.

Definition of Sensation. A sensation being an elementary mental phenomenon cannot be defined in terms of anything more simple. Its meaning can only be indicated by a reference to the nervous processes on which it is known to depend. Accordingly, a sensation is commonly defined as a simple mental state resulting from the stimulation or excitation of the outer or peripheral extremity of an 'incarrying' or sensory nerve. Thus the stimulation of a point of the skin by pressure or rubbing, or of the retina of the eye by light, gives rise to a sensation.[1]

It is important to add, however, that the sensation is not the *immediate* consequent of this action in the peripheral region of the nerve. A sensation does not occur the very instant when the skin is pricked or when sound-waves impinge on the ear. The excitation has to be propagated to the 'seat of consciousness,' the sensory centre (sensorium), before the *mental* effect, a sensation, occurs. It is found by experiment that when the connection between the extremity and the centre is severed, there is no sensation. It has been proved too that the propagation of the stimulation to the centre occupies an appreciable duration.[2]

There are several difficulties in the way of defining sensation. The first of these turns on the fact that the phenomena ordinarily called sensations do not always involve the action of some external agent or stimulus. 'Subjective' sensations of light, for example, have their phy-

[1] 'Sensation' in common parlance refers to the pleasant or unpleasant side of a sense-impression. And psychologists have sometimes employed the word in this way, as when Sir W. Hamilton contrasts sensation as feeling with perception as knowing (*Lectures on Metaphysics*, Vol. II., XXIV.). Here the term will be used to mark off the mental impression which can be discriminated as to its quality, and which for this reason can supply the material of knowledge. The pleasurable or painful aspect or accompaniment of a sense-impression is best marked off by the term 'sense-feeling'. This will be dealt with later on. (For an historical account of the different meanings of the term Sensation, the reader is referred to Hamilton's Edition of Reid's Works, Note D).

[2] The reference of the sensation, according to what physiologists have called the 'law of eccentricity,' to the peripheral extremity, as the skin, will be explained when we come to deal with perception. On the physiological basis of sensation see Dr. Carpenter, *Mental Physiology*, Chap. IV.; Dr. Maudsley, *The Physiology of Mind*, Chap. IV.; Wundt, *Physiologische Psychologie*, Vol. II., Section II., Cap. VII.

sical starting-point in certain disturbances (changes of circulation, &c.) in the retina. Some subjective sensations may have a central process as their starting-point. It may however be said that under ordinary or 'normal' circumstances the sensations of sight, touch, and so on, are the effects of such agents. Other difficulties are due to the imperfect analogy between the sensations of the external sense-organs, those of sight, touch, &c., and the organic sensations, as those connected with the action of the organs of digestion. Here the equivalent of external agent is often wanting, *e.g.*, in sensations of hunger and thirst. Finally, the case of muscular sensations presents a peculiar difficulty to be touched on presently.

It may be observed, further, that a perfectly simple mental state,' such as is required by the above definition, is an ideal conception. In our later mental life, at least, we never have a sensation which is perfectly pure, the bare result of the peripheral stimulation of the moment. As we shall see in the next chapter, the sensations of adult life are uniformly accompanied by some element of perception, and cannot easily be distinguished from this. And even if by introspective analysis we could succeed in eliminating this foreign element, there would remain the fact that our sensations are inextricably overlaid with the traces of past like sensations. Finally, supposing that we could obtain a residuum of pure sensation, we could not be certain that this was a perfectly simple psychical state; for, as we shall see presently, our ordinary sensations which to introspection appear simple or elementary, are probably built up out of sensuous atoms.

Sensibility. The mind's capacity of being acted upon or affected by the medium of the stimulation of a sensory nerve is called sensibility. Sensibility is simply another name for the mind's capability of having sensations. Strictly speaking this property belongs to the mind and not to the body. Yet we are accustomed by an allowable looseness of expression to ascribe sensibility to the organism in so far as it is the *medium* by which sensations are produced. Thus we talk of the sensibility or sensitiveness of the skin, and of the retina of the eye.

General and Special Sensibility. All parts of the organism supplied with sensory nerves, and the actions of which are consequently fitted to give rise to sensations, are said to possess sensibility of some kind. But this property appears under one of two very unlike forms. The first of these is common to all sensitive parts of the organism, and involves no special nervous structure at the extremity. The second is peculiar to certain parts of the bodily surface, and implies special structures or 'organs'. To the former is given the name Common or General Sensibility; to the latter, Special Sensibility.

General Sensibility: Organic Sense. The sensations falling under this head are marked by absence of definite characters. They are vague and ill-defined. Their distinguishing peculiarity is that they have a marked pleasurable or painful aspect or complexion. Such are the feelings of comfort and discomfort connected with the processes of digestion and indigestion, and with injuries to the tissues. These sensations are not directly connected with the action of external objects, but arise in consequence of a certain condition of the part of the organism concerned. Thus they give us no knowledge of the external world. They can at best inform us of the condition of the organism, and they only do this adequately when we are able to 'localise' them or refer them to their precise seat in the organism. And this, as we shall see later, is only possible in the case of sensations produced by actions going on in the external parts of the organism.

Special Sensibility: Special Senses. The special sensations arising through the stimulation of the eye, the ear, and so on, are marked off one from another by great definiteness of character. This peculiarity is connected with the fact that each sense has its own specially modified structure or 'sense organ' such as the eye or the ear, fitted to be acted upon by a particular kind of stimulus (light-vibrations, air-waves, &c.). Owing to this definiteness of character the special sensations are much more susceptible of being discriminated and recognised than the organic sensations. Moreover these sensations are (in ordinary cases) brought about by the action of *external* agents or objects lying outside the organism, and are on that account called impressions.[1] For these reasons they are fitted to yield us knowledge of the environment. It is the special senses which will chiefly interest us in tracing the development of intelligence or knowledge.

Definition of Sense. A sense consists of the sum-total of simple mental states of a particular order, as sights, sounds, and so on. This aggregate of experience is connected with a specially differentiated structure known as the sense-organ, as the eye, the ear, and its connected nerves. Hence it is convenient to define a sense by a reference to this physical groundwork. Thus we may say that a sense is the aggregate of simple mental states arising by way of the stimulation of some sense-organ. In doing so, however, we must be careful not to fall into 'a circle in defining' by going on to define a sense-organ in its turn by a reference to the group of sensations of which it is the groundwork. This may be avoided by giving a purely physical definition of sense-organ. For example we might define it thus: A sense-organ is a structure forming the peripheral termination (end-organ) of a sensory nerve (or group of nerves) and specially differentiated so as to react on a special kind of stimulus. More correctly perhaps the sense-organ should include not only the peripheral organ but the connecting nerve by which the effect of the stimulation is transmitted to the centres, and

[1] The sense-impression which we are here concerned with is a *mental* phenomenon, and must not be confused with the *physical* 'impression,' as, for example, the image of an object on the retina.

even the portion of the centres immediately concerned in the production of a sensation.

This definition supposes that any particular organ, *e.g.*, the eye, can only be acted on by one kind of stimulus (light). Modern experiments show this to be untrue. Thus mechanical pressure, or an electric current, applied to the retina gives rise to a sensation of light. Whether this fact is due to some special difference of structure in the nerves themselves as distinguished from the peripheral organs is a matter of dispute.[1]

The Five Senses. The Special Senses consist first of all of the well known five, namely, Sight, Hearing, Touch, Smell, and Taste. They each involve a special mode of sensibility, and a particular kind of 'end-organ' or terminal structure, fitted to be acted on by a certain kind of stimulus. The only apparent exception to this is Touch. This, as sensibility to mechanical pressure, is very closely related to Common Sensibility. Indeed, Touch has been called the fundamental Sense out of which the other and special senses are developed.[2] But what we distinguish as Touch proper or Tactile Sensibility is possessed in a specially fine form by certain portions of the skin, as the lips and the finger-tips, and here certain modifications of nervous structure are found to exist. Hence we may speak of a special sense, and a special organ, of touch.

Characters of Sensations. The importance of the special senses depends as we have seen on their possessing certain well-defined characters, whereby

[1] This is the question of 'the specific energy' of the nerves. On this see Lewes *Physical Basis of Mind*, Prob. II., Chap. III Wundt, *Physiologische Psychologie*, 7es Cap., p. 313, *et seq.* A brief account of Wundt's reasoning will be found in *Mind*, No. I. (1876), p. 32, &c.

[2] See Sir W. Hamilton's *Lectures on Metaphysics*, Vol. II., Lect. XXVII.; and H. Spencer's *Principles of Psychology*, Vol. I., Part III., Chap. IV.

they are fitted to be signs or indications of qualities in external objects, as well as of the changes which take place in these. The sum-total of our knowledge of things is limited by the number of distinguishable characters among our sensations. We will first enquire into these distinguishable characters generally, and then briefly indicate their varying importance in the case of the different senses.

Intensity or Degree. The most obvious difference of character among our sensations is that of degree or intensity. The difference between a bright and a faint light, a loud and a soft sound, involves a difference of intensity in the sense-impressions. All classes of sensation exhibit differences of degree. Those of the special senses exhibit them in greater number than other sensations. These differences of degree are intellectually important as a clue to the nature or structure of bodies, the force exerted by them, their distance from us, and so on. Thus a vivid sensation of light indicates (according to circumstances) the brightness of an object (*e.g.*, a flame, a mass of snow), or its nearness to the eye.

Relation of Degree of Sensation to Force of Stimulus. The degree of a sensation varies with the force of a stimulus. Thus the sensation of a bright light or loud sound answers to a great intensity or 'height' of the waves (ether or air waves) constituting the stimulus. On the other hand the impression of a faint light or of a soft sound answers to a feeble intensity or a low altitude of the undulations concerned.

Since the physicist is able to measure with considerable accuracy the intensity or force of different stimuli, it has been found possible to apply a graduated series of stimuli to a sense-organ and to note the relation of successive increments of stimulus to the resulting sensation. These researches belong to the department of psycho-physics. Among the most important results are the following.

Every stimulus must reach a certain intensity before any appreciable sensation results. This point is known as the threshold or liminal intensity.

The situation of this point determines what has been called the *Absolute Sensibility* of an organ or part of an organ. Thus if two portions of the skin, A and B, differ in respect of their sensibility to pressure in such a way that a slighter force of impact (mechanical pressure) causes a sensation in the case of A than in that of B, we say that A has greater absolute sensibility than B.

When the threshold is passed an increase of the stimulus does not always cause an increase in the intensity of the sensation. A very slight increase (increment) may produce no appreciable effect. It is further found that the increment required to produce an appreciable difference in the sensation depends on the absolute intensity of the stimulus. Thus a very slight addition to a light-stimulus which would be sufficient to produce an increase of intensity in case of a feeble sensation would produce no effect in the case of a powerful one. Thus, let us suppose s and $5s$ to represent two stimuli of unequal intensity, and i a small increment. Then though the sensations produced by s, and $s + i$ would be felt to differ, the sensations produced by $5s$ and $5s + i$ might remain indistinguishable. The greater the intensity of the stimulus at work the greater must be the increase of stimulus in order that a perceptible difference in the resulting sensation may arise. It is found that the required increment is in every case directly proportionate to the intensity of the stimulus. Thus whatever the value of s, in order to produce an increase in the intensity of the sensation, s must be increased by ks, where k stands for some constant fraction, as $\frac{1}{10}$.

These results may be expressed as follows: In order that the intensity of a sensation may increase in arithmetical progression, the stimulus must increase in a geometrical progression. This is known as Weber's or Fechner's Law.[1]

The magnitude of the fraction representing the increment of stimulus necessary to produce an increase of sensation determines what has been called the *Discriminative Sensibility*. The smaller the fraction, the greater the discriminative sensibility. Thus the discriminative sensibility of the finger-tip to pressure is about twice that of the sensibility of the shoulder-blade, the fractions being approximately $\frac{1}{6}$ and $\frac{1}{3}$.

When the stimulus is increased up to a certain point, any further increase produces no appreciable increase in the sensation. Thus a very powerful sound may be increased without our detecting any difference. Similarly in the case of a light-stimulus. We do not notice any difference in brightness between the central and peripheral portion of the

[1] This fraction differs considerably for different sense-organs.

sun's disc though the difference of light-intensity is enormous. Wundt calls this upper or maximum limit the Height of Sensibility of a Sense. The higher this point in the scale the greater, according to him, the Receptivity (Reiz-empfänglichkeit) of the organ.[1]

Finally, by taking together the Threshold and Height we have what Wundt calls the Range of Sensibility (Reiz-umfang). The lower the former or minimum limit, and the higher the latter or maximum, the greater the range of sensibility. That is to say, the relative range is measured by a fraction of which the numerator is the Height, and the denominator the Threshold. It is important to add that these aspects of sensibility to stimulus do not vary together. Fechner ascertained that parts of the skin equal in respect of absolute sensibility to pressure differed considerably in discriminative sensibility. Nor does a high maximum limit or height necessarily indicate a proportionately large number of perceptible differences of degree. Discriminative sensibility is thus an independent aspect of sensibility, and by far the most important for intellectual purposes (knowledge of things).[2]

Quality of Sensation. Next to differences of intensity or degree we have differences of quality among our sensations. By a difference of quality is meant one of kind and not simply of degree. The group of sensations making up a particular sense, as those of sound, are marked off by a broad difference of *generic* quality. In addition to these broad differences there are finer differences of *specific* quality within each sense. Thus there are the differences of quality answering to different colours in sight, to sounds of different pitch and of different timbre or

[1] See *Physiologische Psychologie*, Cap. 8, § 1.

[2] The relation between the degree of stimulus and that of sensation is less simple than is assumed in the text. Observation does not fully support the generalisation known as Weber's law. This is found to hold good only with respect to stimuli of medium strength: as we approach the threshold or the height, considerable deviations from it occur. For a fuller exposition of the law and the facts on which it is based see my *Sensation and Intuition*, Chap. III., p. 48, &c.; and Mr. Ward's article in *Mind*, Vol. I., 1876, p. 452. The reader who wishes to be abreast of the present state of the question should further consult Wundt, *Physiol. Psychologie*, 8es Cap.; Fechner, *Revision der Hauptpunkte der Psychophysik;* and Stumpf, *Tonpsychologie*, Theil

musical 'quality' in hearing, and so on. These differences of quality are much sharper or more definite in the case of some sensations than in that of others. Such differences, like those of degree, serve as a clue to the properties of external objects. The difference between gold and iron is partly a difference of colour. Musical instruments, including human voices, are distinguished partly by their peculiarities of timbre.

It is important to observe that we are apt to ascribe a difference of quality to objects on the basis of a difference of degree in our sensations. Thus we are often disposed to think of two shades of one and the same colour as two colours. Yet in this case there is no difference of quality in the sensation, only one of degree answering to degrees of brightness. Similarly the difference between heavy and light bodies appears to turn on a difference of degree in the sensations.

Ultimate Differences of Quality: Simple and Complex Sensations. It is a matter of uncertainty what number of ultimate differences of quality among our sensations it is necessary to assume. Modern research goes to show that two sensations which appear to our minds quite different in quality may have certain elements in common. In other words sensations which are unanalysable by conscious reflection into simpler parts or elements may have to be regarded as complex. Thus according to Helmholtz musical sensations of timbre are composite phenomena, being compounded of elementary sensations answering to "partial tones" (fundamental and upper tones). Similary our seemingly simple sensations of colour are probably compounded of more simple parts. Not only so, some psychologists as Mr. H. Spencer and M. Taine, would seek to carry the 'objective analysis' of sensation still further, resolving all differences of quality among our sensations into differences in the mode of combination of the same ultimate psychical elements, or "units of consciousness," namely sensuous atoms or 'nervous shocks'. These researches and speculations go to show that subjective analysis is not always adequate to the breaking up of a complex mental state into its parts. The parts may fuse or coalesce into an inseparable mass.[1] For ordinary psychological purposes, however, we start with sensations which appear to be perfectly simple in quality, such as those of the perfectly distinct colours blue, red, &c., as our units.

Physiological Basis of Differences of Quality. Generic differences of quality are, as we have seen, connected with the mode of stimulation (by air-waves, æther waves, and so on). Specific differences are further known in many cases, at least, to be connected with differences in the form of stimulation. Thus the several sensations of colour are produced by the action of æther waves of different lengths, or, what amounts to the same thing, vibrations of different rapidities. The same holds good of the sensations of sound. The sensation of a high note answers to a rapid series of air vibrations, that of a low note, to a slow series.

It is a disputed question whether to every class of simple sensations there answers a special nerve-structure, or whether simple sensations of different quality may be brought about by unlike modes of reaction of the same nervous elements. According to the former view every ultimately simple or elementary sensation corresponds to the function or activity of one kind of simple nerve-structure, or nerve-element. In the case of hearing it is fairly certain that a large number of distinct nerve-elements are concerned in our several sensations of pitch. The same is probably true of the sensations of colour. Yet it cannot be said that physiological research has completely established the correspondence here hinted at.[2]

Other Characters of Sensation: Duration. We have now discussed the two leading characters of Sensation, its degree or intensity and its quality. In addition to these, our sensations exhibit other characters, though these are not so distinctly present in all classes of sensation as are degree and quality.

[1] On the question of the ultimate elements of Sensation see *Sensation and Intuition*, Chap. III., p. 57, &c.; H. Spencer's *Principles of Psychology*, Vol. I., Part II., Chap. I. ("The Substance of Mind,") § 60; and M. Taine's work *On Intelligence*, Part I., Book III., Chap. II., § V.

[2] The problem as to the ultimate number of nerve-elements required as the groundwork of our sensations is closely connected with that of specific energies. (See Hermann, *Human Physiology*, p. 344). The difficulties in the way of supposing distinct nerve-elements for all distinguishable sensations are well shown by Wundt, *Physiologische Psychologie*, Cap. 7, § 4, p. 315, &c.

The first of these is Duration. All Sensations, as indeed all mental states, have duration: they endure for a shorter or longer period. Such differences of duration range from the shortest possible, that of a momentary sensation, up to the longest possible, that compatible with a protracted direction of the attention. Yet all classes of sensation do not present this aspect with equal clearness. Some sensations, as tastes and smells, are much less sharply defined in respect of their commencement and termination than others: their duration is less distinct or definite than that of other sensations, as those of sound. The importance of this difference will appear later on.

The duration of a sensation is related in general to that of the process of nervous stimulation involved. A momentary sensation, as that of a flash of light or of a staccato note, answers to a momentary stimulation. But the correspondence is not exact. The effect of a stimulus may persist for an appreciable duration after it has been withdrawn. This lingering effect of stimulation has been named after-sensation. The sensations of taste and smell exhibit this effect in a marked degree. The want of definiteness in the cessation of a sensation of taste or smell is probably due to this circumstance. In the higher region of light-sensations we have these effects as occasional phenomena in what are known as positive after-images.

Local Character. One other character needs to be touched on, which may be named Local Character. By this is meant a difference between two sensations, perfectly similar in degree and quality, which are received by way of two different points of the surface of the organ. Thus when the skin is gently pressed by two points, as those of a pair of compasses, at different parts we receive two similar yet distinct sensations.

In order to understand what this difference of local character means, we must mark it off from that local *interpretation* of sensation which occurs instantaneously in our mature life. When two points of the skin are touched we instantly refer the sensations to these particular localities, or 'localise' them in these points. This however is an act of perception and has (to a considerable extent at least) to be acquired by each individual. In order to understand how this is acquired we must assume that there is some original difference in the sensations themselves connected with the fact that they depend on the activity of distinct nerve-fibres. This original difference is one of quality and not of quantity. It is a difference of colouring the exact nature of which we are now quite unable to recall or imagine. This unknown original difference is all that is meant here by the expression local character.

This separateness of the sensations corresponding to separate nerve-fibres may be seen in different ways. In the case referred to above we have two distinct sensations answering to two discrete points of the surface. This mode of discriminative sensibility has been called plurality of points. Two tangible or visible points are always felt or seen to be two discrete points when they lie at a certain distance from one another. If, however, they are nearer than this they are no longer distinguished as two.

If instead of two discrete points a continuous system of such points on a surface is applied to the skin the local character shows itself under the form of the 'massiveness' or extensive magnitude of the sensation. If I apply a piece of tin-foil one inch square to the hand, and then apply to an adjacent part a second piece two inches square, the second sensation is felt to be different from the first. And the difference is not the same as would arise if I simply doubled the pressure over the same surface by placing a second piece of the same size above the first.

These differences of local character, are not found in all classes of sensation alike. They presuppose certain physiological conditions which are only to be found in the case of two senses, Touch, and Sight. Hence in part the explanation of the fact that these senses are the only ones which give us a direct knowledge of space, in its several aspects, number and position of points, and magnitude and figure of objects.

The physiological conditions here referred to may be said to reside in the existence of a sensitive surface supplied by a system of similar yet distinct and isolated nerve-fibres, which may be acted on apart from one another by locally circumscribed stimuli. These conditions obtain only in the case of two senses, namely, Touch and Sight. The skin and the retina are surfaces of this kind. The skin can be acted on directly by a point applied to any one portion of its surface. And owing to the structure of the eye rays of light coming from a particular luminous point may impinge on a definite point of the retina. In the case of Hearing, however, such a local effect is rendered impossible, partly by the nature of the stimulus and its mode of propagation through the ear, and partly by the absence of a system of similar fibres spread out over a surface.

Variability of Sensation. In order that a sensation may supply knowledge about an external thing, it must not vary. That is to say the same stimulus must always bring about the same kind and degree of sensation. These conditions do not, however, hold good perfectly. Our sense-organs are liable to changes of condition which modify the psychical effect of a stimulus. Thus the organ of taste may be temporarily affected by the persistence of a preceding sensation, which combines with and so disguises the effect of a succeeding stimulus. Again a nerve-structure may be temporarily fatigued by the action of a preceding stimulus, and so rendered less sensitive to a second stimulus of the same kind. After tasting a strong saline solution a substance moderately salt is not felt to be salt at all. Sensations of temperature show these momentary fluctuations in a marked degree. Finally a sense-organ may be more permanently modified. Thus for example the senses of smell and taste are liable to be disturbed by a cold and other causes. Though these disturbances are not confined to the lower senses, they are much more distinct and prominent in this region. The sensations of taste, smell, and temperature are pre-eminently the variable sensations.[1]

Coming now to the senses in detail we see that they do not exhibit the same degree of definiteness or the same number of distinct characters. We usually speak of Taste and Smell as the coarse or unrefined senses, whereas Hearing and Sight are highly refined. By attending simply to the degree of refinement we may arrange the senses in the following ascending order, Taste, Smell, Touch, Hearing, Sight.

No detailed exposition of the senses can be given here, but only a brief enumeration of their characters.

Taste and Smell. These present a decidedly low measure of refinement. Indeed the sensations of these senses may be said to approach the organic sensations in want of definiteness, and in the predominance of the element of feeling (pleasure and pain). These peculiarities are connected with the fact that these senses have as their function the determination of what is wholesome or unwholesome to the organism as a whole. The very position of the organs at the entrance of the digestive and respiratory cavities suggests that they are sentinels

[1] For a fuller account of these modifications of sensibility see my work on *Illusions*, Chap. IV., pp. 64-69.

to warn us as to what is good or ill. The sensations of taste and smell are easily confused one with another,[1] cannot be definitely distinguished either in degree or quality. We cannot distinguish a number of simultaneous tastes or odours as we can distinguish a number of touches locally separate from one another. Again, owing to the persistence of sensations, we cannot discriminate two odours or two tastes in rapid succession. And lastly, both modes of sensibility are liable to great fluctuations, temporary and permanent. Hence they are of little importance as knowledge-giving senses. It is only under special circumstances, as those of the chemist, the wine-taster and so on, that these 'servants of the body' supply a quantity of exact knowledge about the properties of objects.

Touch. By the sense of touch is meant the sensations we receive from the contact of bodies with the tactual organ. These are either sensations of mere contact or pressure, or those of temperature. Although sensibility to pressure is probably the simplest and least specialised form of sensibility, the sense of touch supplies us with much more knowledge than those of taste and smell. In its highest and more special form, connected with definite portions of the bodily surface, more particularly the hands, and especially the finger-tips (with which the lips may be reckoned), the tactual sensibility becomes a most important means of ascertaining the properties of bodies. The sensations of touch have a much higher degree of definiteness than those of taste and smell. Since

[1] This want of distinctness is seen too in the confusion of smells with tastes.

they have little persistence we may distinguish two or more impressions finely in rapid succession. This rapid sequence of distinct impressions is greatly promoted by the mobility of the main tactual organ (the hand). Again, the local separation of touch-sensations allows of a nice discrimination of *simultaneous* impressions.

The discrimination of degree of pressure has been measured by means of experiments. A certain weight is laid on the hand or other part, and the experimenter then tries how much must be taken away or added in order that a difference may be felt.[1] A much smaller difference is felt when the same part of the tactual organ is stimulated than when two parts are taken. Thus when the same hand is selected the difference detected is (in some cases) $\frac{1}{10}$ of that recognised when the two hands are successively tried. Further it was found that the discriminative sensibility of one and the same part varies considerably at different regions of the bodily surface. For instance, on the anterior surface of the fingers the difference detected was a half of that recognised on their posterior surface.[2]

The smallest difference detected in the case of two hands is $\frac{1}{3}$; in the case of the same hand, from $\frac{1}{14}$ to $\frac{1}{30}$. Again, the smallest difference recognised in the case of the posterior surface of the finger is $\frac{1}{3}$; in that of the anterior surface, $\frac{1}{6}$.

[1] If the hand is the part selected it must be supported by some object, as a table. Only in this way can we test the *tactual* sensibility to pressure apart from the *muscular* sensibility to be spoken of presently.

[2] As before remarked the variations in discriminative sensibility at different parts of the organ do not run parallel to variations in absolute sensibility. See Wundt, *Physiol. Psychologie*, I., Cap. 8, § 2, p. 342.

Besides differences of degree in the case of sensations of touch we have important differences of quality, as between those of smoothness and roughness.[1] To these differences must be added the important qualitative difference between hot and cold.

Finally we have the local differences which constitute so important a feature of our touch sensations. The capability of distinguishing two points at different parts of the bodily surface has been tested by Weber by means of the extremities of a pair of compasses. The smallest distance between these needed to produce two distinct sensations determines the degree of local sensibility of this part. It is much finer in the mobile parts of the body (hands, feet, lips, &c.) than in the comparatively fixed parts (the trunk).[2] It is finest at the tip of the tongue (which along with the lips shares in the specialised tactual sensibility of the hand). A difference of a millimetre is here detected.[3] At the tip of the finger a distance of two millimetres is just perceptible. The local sensibility is finer on the anterior than on the posterior surface of the hand, and decreases rapidly as we recede from the finger-tips towards the wrist and elbow.

[1] It is a question how far such differences as smoothness and roughness, sharpness and bluntness, hardness and softness, and so on, involve original differences of quality (other than 'local' differences) in the sensations, and how far they turn on differences of degree, coupled with local differences. On this point see Wundt, *Op. cit.*, Cap. 9, § 1, p. 368.

[2] This suggests that local discrimination has been developed through successive generations by the help of movement. The importance of movement in developing the perception of locality by touch will be shown in the next chapter.

[3] A millimetre is one thousandth part of a metre, and is equal to ·0393 of an inch.

If at any particular point of the skin we estimate exactly the distance between the two compass-points at which they cease to be distinguished as two, and take this measurement in a variety of directions, we obtain what is known as a 'circle of sensation' (Empfindungskreis). We may suppose the bodily surface to be made up of myriads of such small circles. These vary greatly in size (from about 1 to 65 millimetres in diameter). Also they vary to some extent in form. Thus, since the discrimination of points is commonly finer across a limb than in a longitudinal direction, the circles must here be supposed to be oval. We must not imagine the circles to lie wholly outside one another in a mosaic arrangement. They overlap one another in an intricate way. This seems to exclude the supposition that a distinct local character is given under all circumstances to the sensations answering to each nerve-element running to the part. The local discrimination varies with the supply of nerve-fibres, but there is no exact correspondence between them.[1]

Hearing. The Sense of Hearing ranks high as an intellectual or knowledge-giving sense. This is owing to the high degree of definiteness of its sensations. In respect both of intensity and of quality fine differences are recognisable.

With respect to intensity, experiments have been conducted by a number of investigators with the object of ascertaining the threshold, the height, and the least noticeable differences of intensity. With respect to the last it has been found that the smallest difference of the objective stimulus perceptible is (roughly) represented by the ratio 3 : 4.[2]

[1] For a fuller account of the results of Weber's experiments see Bernstein, *The Five Senses of Man*, Chap. II.; Wundt, *Physiol. Psychologie*, II., Cap. 11, § 2, p. 7, &c.

[2] This was ascertained by different methods. Volkmann employed at first a hammer which swung, pendulum-like, striking a plate. Later on he (followed by Nörr) used a steel ball which he allowed to fall a certain distance and strike a steel-plate. According to Vierhordt, the force of the stimulus must be taken as proportionate to the square root of the height through which the body falls. Adopting this view we find that the real proportion is $\sqrt{4} : \sqrt{3}$. See Fechner, *Elemente der Psychophysik*, Vol. I., p. 175, &c.; Wundt, *op cit.*, I., Cap. 8, § 2, pp. 340, 1; Stumpf, *Tonpsychologie*, § 15, p. 354, &c.

The high intellectual character of hearing shows itself most plainly in the qualitative differences. We have here the broad contrast between musical and non-musical sounds or noises. The former depend on regularly recurring or periodic vibrations of the air, the latter on irregularly recurring or non-periodic vibrations. In the case of musical sounds we have the remarkable phenomenon of a *scale* of sensation. If we pass upwards from a low note to a higher one through all distinguishable gradations we experience a continuous variation of sensation in one respect, namely, pitch or height. This scale or series of similar or analogous changes (increase or decrease of pitch) is described as a 'continuum' of one dimension. All these differences of pitch are known to answer to changes in the rate of vibration of the medium (the atmosphere). The higher the note the more rapid the vibrations.[1]

It has been supposed by Helmholtz and others that these differences of pitch sensation involve the reactions of distinct nerve-elements. These are the so-called organs ('fibres,' 'columns') of Corti in the cochlea or shell-compartment of the inner ear. These fibres are arranged somewhat in the manner of a key-board, and it is supposed that different rates of atmospheric vibration affect different fibres. But later research shows this hypothesis to be doubtful.[2]

This scale of sound-quality or pitch presents striking points of similarity with the scale of intensity. If we begin with the lowest note we find that there is a threshold or a rate of vibration below which the ear is insensible to pitch. Here the atmospheric vibrations are felt as dis-

[1] Thus the series of vibrations concerned in the note C below the treble cleff stands to that involved in the C an octave above it in the ratio 1 : 2; and to that involved in the G a fifth above it in the ratio 2 : 3.

[2] For a fuller account of the structure ot the ear and the probable functions of its several parts, see Bernstein, *Five Senses of Man*, Sect. III., Chap. 1 and following; Wundt, *Physiologische Psychologie*, I., Cap. 7, § 4, p. 296, &c.

tinct pulsations, and not as a continuous sensation of tone. At the other extremity we find a height or a point of maximum pitch, above which the ear experiences no sensation of tone proper, but only a grating kind of noise. Finally, within these extremes, the least noticeable difference of sensation corresponds to one and the same proportion of the stimuli. (On the nature of the pitch-scale, see Stumpf, *Tonpsych.*, § 10.)

In the discrimination of pitch the ear shows a delicacy far superior to that of the other senses. The smallest difference recognised in our musical scale (a semi-tone) is by no means the smallest perceptible. In the median region of the scale an unpractised ear can easily distinguish tones which differ by only a few vibrations per second; and a practised ear can even detect a difference of a fraction of a vibration.[1]

In addition to this scale of pitch-quality, there are the differences known as timbre or 'musical quality'. These are the qualitative differences in sensations of tone answering to differences in the instrument, as the piano, the violin, the human voice. These differences have been explained as due to the various composition of the several kinds of tone. Musical tones or clangs are rarely if ever simple sensations, but compounded of a number of elements. These correspond to a fundamental or ground tone, and to subordinate upper tones. The number and strength of these last determine the timbre of the note.[2]

In addition to this wide range of musical sensation

[1] Thus one person's discrimination of pitch is represented by the ratio 440 : 439·636; another person's by the ratio 1000·5 : 1000.

[2] For a fuller account of the composite nature of tone or clang and the influence of upper tones on our sensations of timbre, together with those of discord and harmony, see Helmholtz's great work, *The Sensations of Tone*, translated by A. J. Ellis. A summary of Helmholtz's doctrine may be found in my volume, *Sensation and Intuition*, Chap. VII.; also in Bernstein's work, *The Five Senses of Man*, Sect. III., Chap. VII., VIII.

the ear distinguishes a vast number of non-musical sounds, the characteristic 'noises' of different substances, such as the roar of the sea, the rustling of leaves, and the crack of a whip. We distinguish noises as jarring, grating, explosive, and so on. These differences are in part connected with the strength and rapidity of the single pulsations composing the noise. But most noises involve elements of tone as well, and owe a part of their character to this circumstance (*e.g.*, the roar of the sea or of a crowd). This remark applies to articulate sounds, the most important class of non-musical sounds. The researches of Helmholtz go to show that different vocal sounds are characterised by peculiarities of timbre.

Enough has been said to illustrate the high degree of refinement characterising the sense of hearing. The delicate and far-reaching discrimination of quality, aided by the fine discrimination of duration, enables the ear to acquire a good deal of exact information, as well as to gain a considerable amount of refined pleasure. The delight of music sums up the chief part of the latter. The former is illustrated in the wide range of knowledge derived by way of that system of articulate sounds known as language.

As a set off against these advantages, we see that hearing has very little local discrimination. We cannot distinguish two or more simultaneous sounds with any nicety according to the position of their external source. Hence hearing only gives us (directly), as we shall see by and by, very little knowledge of the position of bodies in space, and of their figure and magnitude.

It is commonly said that we distinguish between a 'massive' or voluminous sound, as the roar of a wide expanse of water, or the sound of a great chorus of voices, and an 'acute' or non-voluminous sound, as that of a falling streamlet, or of a single voice. It is a question how far (apart from movement of the head) the ear distinguishes elements of such a compound mass of impressions by their local characters. In other words it is doubtful how far the ear distinguishes degree of extensive magnitude. The fact that we have two ears, and that sounds according to their position affect the two ears unequally, constitutes a quasi-local difference. The real power of the ear in discrimination is in analysing a compound mass of sounds of different pitches into its parts. In most voluminous sounds different pitches and timbres are easily distinguishable. (*Cf.* Stumpf, *op cit.*, p. 210.)

Sight. The sense of Sight is by common consent allowed the first place in the scale of refinement. The delicate and intricate structure of the organ, and the nature of the stimulus (ether-vibrations), give to its impressions a special degree of definiteness.

The scale of intensity in the case of visual sensations is obviously a very extended one. It answers to all distinguishable degrees of luminosity from the brightest self-luminous bodies which we are capable of looking at, down to the objects which reflect a minimum of light and are known as black. The eye's capability of recognising at a glance the nature of an object and of a multitude of unlike objects in a scene, rests in part on this delicate discriminative sensibility to degrees of light.[1]

Here again careful experiments have been conducted in order to ascertain the limits of intensity. It is found that (in a certain region of

[1] The intensity of a light-sensation does not depend simply on the degree of objective luminosity, but also on the condition of the organ. The sensibility of the eye varies periodically during the 24 hours. According to Aubert and C. F. Müller an object only appears half as bright in the evening as in the morning. The eye also accommodates itself to the varying degree of illumination, as direct sun-light, lamp-light, &c.

the scale)[1] the eye distinguishes two stimuli having the ratio of intensity (about) 120 : 121. These experiments were carried out by Bouger, Volkmann, Aubert, Masson and others, partly by means of two lights throwing a double shadow of a rod on a white screen, and partly by means of rotating discs having circles of unequal brightness. The results differed in different series of experiments. Some investigators make the fraction much less (*e.g.*, Aubert $\frac{1}{186}$). This fineness of quantitative discrimination belongs only to the central area of the retina (or area of perfect vision). On the side parts of the retina it is much less. The discrimination of degree is much less fine when instead of white, coloured light is employed.[2]

In sight, again, we have numerous and fine differences of quality. Of these the most important are colour-differences. The impressions of colour, like those of pitch, fall into a series of gradual changes. Passing from one extremity of the spectrum (or rainbow) scale to another the eye experiences a series of perfectly gradual transitions. These changes fall into the series, violet, blue, green, yellow, orange, and red, together with certain finer distinctions, as indigo blue, greenish blue. These differences of quality accompany (as in the case of pitch-sensations) changes in the rapidity of the vibrations constituting the stimulus. Thus the violet rays make about 667 billions, the red rays about 456 billion vibrations per second.

This series of colour sensations differs, however, from that of tone or pitch sensations. To begin with, the quality of the sensation does not change continuously in close correspondence with the changes of the stimulus, as in the case of tone sensations. In some parts of the series considerable changes in the rate of vibration have no appreciable effect on the sensation. Hence we cannot speak of a colour-scale in the same sense as we speak of the tone-scale.[3]

[1] See above, p. 115, note 2.

[2] For a fuller account of these investigations see Wundt, *Physiol. Psychologie*, I., Cap. 8, § 2, p. 335, &c.

[3] It follows that there is no constant ratio in the region of colour discrimination. Dobrowolsky has estimated the least perceptible difference at different points of the colour-scale. At the red end it is as much as from $\frac{1}{12}$ to $\frac{1}{167}$; whereas in the region of the yellow it falls to $\frac{1}{772}$.

Again, the series of colour impressions, instead of falling into a straight line, each successive difference being further removed from the starting-point than its predecessors, rather assumes the form of a bent or curved line. The extremities red and violet seem to approach one another. This affinity between the extremities of the spectrum is seen in the fact that if the rays are combined we have an intermediate sensation, that of purple, which forms a connecting link between the two.[1]

In addition to this series of colour-sensations we have for any given colour a scale of purity or saturation. A red or a green, for example, may be more or less whitish, or on the other hand pure or saturated. Thus any colour will present a series of changes according as we vary the proportion of white light to the special kind of light. In certain cases a difference in the degree of saturation is commonly spoken of as a difference of colour. Thus what we call pink is simply a whitish modification of a purple.[2] ? red

The several kinds of rays when all combined, as in sunlight, produces the impression white. The same sensation may result from combining different pairs of the several varieties of light in certain proportions. Such pairs of rays, and the accompanying impressions of colour, are spoken of as complementary one to another. Thus blue and yellow, purplish red and green, are complementary. If we add purple to the spectrum series and represent this by a circle, we find that any two kinds of light standing opposite

[1] The points of difference between the tone and colour scales are brought out by Helmholtz, *Physiologische Optik*, p. 236, *et seq.*

[2] Differences in the degree of saturation must be carefully distinguished from differences in the brightness or degree of brilliance of a colour. This last depends on the quantity, and not the quality of the light. The brighter degrees are known as tones, the darker as shades of a colour. A difference of quantity in the light sometimes makes a difference in the quality of the sensation. Thus a brown is simply a dark shade of yellow or red.

to one another or at the extremities of one diameter are thus complementary. Such complementary colours are commonly said to go well or to harmonise well with one another.

The many and intricate phenomena of colour-impressions, including the effects of mixing colours (either by combining rays, or by compounding impressions on the retina), the phenomena of negative or complementary spectra or after-images, and of chromatic contrast, and lastly the facts of colour-blindness, have given rise to various physiological hypotheses respecting the structure and mode of activity of the retina. Among these the most popular is known as the Young-Helmholtz theory. According to this the nervous elements of the retina consist of three kinds of fibre. These are acted upon more especially by the red, the green, and the blue or violet rays respectively. These three colours would thus be in a peculiar sense elementary colour-impressions, while other colours, as purple, bluish green, together with white, would be composite. According to a second theory, that of E. Hering, there are two kinds of nerve-element. These structures, again, are capable of two antagonistic modes of activity. To each of these a distinct colour-impression corresponds. Thus we have four simple or leading colour-impressions. One kind of element is concerned in the sensations blue, yellow, and the other in the sensations red, green. In addition to these two varieties of nerve-element Hering postulates a third, the two opposed processes in which underlie sensations of white, black. This hypothesis aims at obviating some of the difficulties of the Young-Helmholtz theory. It is recommended by the fact that it erects into elementary or fundamental colour-impressions four varieties which we are all accustomed to regard as leading and distinct colours. In its turn, however, it gives rise to special difficulties.[1]

In addition to these numerous differences of intensity and quality the sensations of sight are characterised by very fine local differences. And it is this circumstance, together with another to be spoken of presently, which gives sight so distinct a superiority to hearing as an intellectual or knowledge-

[1] For a brief account of the facts here referred to, see Bernstein, *Five Senses of Man*, Sect. II., Chap. V. For a comparison of the rival hypotheses, see Le Conte, *Sight*, Pt. I., Chap. IV., p. 61 &c.; and Wundt, *Physiol. Psychologie*, I., Cap. 9, § 4, p. 460, &c.

giving sense. The retina is an extended surface, on any point of which (owing to the peculiar structure of the eye) an isolated optical effect may be produced. The sensations received by way of different parts of the retina have, from the first, distinct 'local' peculiarities. The fineness of this local discrimination is greatest in the central region, the area of perfect vision. In order to measure the local discrimination in this region experiments have been carried out by means of two lines placed at a certain distance from the eye and brought gradually nearer one another. These shew that in the case of a practised eye two points are distinguished when the visual angle is from 60 to 90 seconds, that is to say when the retinal images are from ·004 to ·006 millimetres apart. In the side portions of the retina this fine local discrimination rapidly falls off.

This may be seen in the following table, in which the results of looking at two squares one metre from the eye are recorded :—

Distance of retinal image from centre of retina.	Minimum distance of two images.
2° 40′	3′ 27″
5°	17′ 11″
7°	34′ 22″

This decline in discriminative ability does not progress with perfect regularity, and is not equally rapid in all directions. An attempt has been made to connect these limits of local discrimination with the magnitude of the terminal appendages of the optic fibres. These are known as the rods and cones. Since the cones are densely packed in the area of perfect vision while they become less numerous and give way to rods towards the periphery, it seems probable that the former are the structures specially concerned in local discrimination. Measurement of these cones goes to show that their diameter corresponds (roughly) to the limits of local discrimination.[1]

[1] For a fuller account of the experiments respecting the local discrimination of the retina, see Wundt, *Physiol. Psychologie*, II., Cap. 13, § 1, p. 65, &c.

Muscular Sense. Over and above the five special senses there is a sense of great importance in relation to knowledge known as the Muscular Sense. This consists of the sum of simple mental states or 'sensations' which immediately accompany the action of the muscles. These have well-marked characters of their own. The sensations which accompany an exercise of the vocal organ, a movement of the arm or leg, an effort to push a heavy body, have certain common traits, and these mark them off from all other special classes of sensation.

At the same time, the muscular sense occupies a peculiar place and cannot be classed with the five senses. For one thing the muscular sensations are due not to the action of external objects like sense-impressions, but to our own actions. They are thus essentially *active* states, and so stand in antithesis to the sensations of the five senses which are *passive.* This circumstance gives them their characteristic quality which we indicate by describing them as feelings of exertion, effort, or energy. Moreover it will be seen presently that the muscular sense is not detached from the special senses as these are detached from one another, but enters into combination with these, and more especially with the senses of touch and sight.

There is a good deal of uncertainty about the exact nature and physiological concomitants of muscular sensations. Some writers, as Professor Bain, hold that they arise in connection with the process of 'innervation' or the outgoing nervous impulses from the motor centres to the muscles, and are best described as sensations of expended or expending energy. Others maintain that they arise in connection with an incoming nervous process in the sensory nerves. This may be either the nerves running to the skin and other tissues adjacent to the muscles, and which are therefore pressed or strained by muscular contraction ; or the sensory nerves which are now known to enter the substance of the muscles itself.[1]

The evidence on which a conclusion must be arrived at includes the results of psychological analysis, of anatomical research, and of pathological observation (effects of loss of passive sensibility and of paralysis). The probable conclusion from the whole body of evidence is that a process both of motor innervation and of sensory stimulation is involved. The degree of the innervation determines the intensity of the sensation of effort ('sensation of innervation' or of expended energy). On the other hand there are sensations connected with the process of muscular contraction itself involving incoming nerve-processes. These consist probably of muscle-sensations proper connected with the activity of the sensory fibres which run to the muscles, and of other sensations arising through the stimulation of the sensory fibres which terminate in the skin and other adjacent structures.[2]

Variety of Muscular Sensations. The sensations which accompany muscular action may be conveniently divided into two main varieties. Of these the most important are *(a)* sensations of movement or of unimpeded energy, and *(b)* sensations of strain or resistance, that is of obstructed or impeded energy. The first are illustrated in the mental accompaniments of movements of the eyes or of the arms in empty space; the second are exemplified in the mental state which accompanies the act of pushing against a heavy object, or holding a heavy weight in the hand. This is the great difference of quality among our muscular sensations.

In the sensations of movement the passive elements (sensations of

[1] It is plain that if this last view be correct muscular sensations correspond much more closely to our above definition of sensation than they would do on the first supposition.

[2] For a fuller discussion of the subject, see G. H. Lewes, *Problems of Life and Mind*, Third Series, III., Chap. VII. ; Dr. Ferrier, *The Functions of the Brain*, Chap. IX. ; Dr. W. James, *The Feeling of Effort;* Wundt, *Physiol. Psychologie*, I., Cap. 9, § 1. A history of the doctrine is given by Dr. Bastian, *The Brain as an Organ of Mind*, Appendix.

contraction, skin-sensations of tension, &c.) are a prominent feature. In those of strain, on the other hand, the sensations of innervation are the chief ingredient. To these must be added the skin sensation of pressure which always accompanies the experience of resistance. It may be added that the two kinds of muscular experience here distinguished commonly combine. Thus in lifting a weight, or pushing a heavy body, there is the experience of resistance and of movement.[1] Even when we move our limbs there is the resistance of their weight to be counteracted; and this circumstance (especially when we are tired) gives to the experience something analogous to what is commonly understood as the feeling of strain or resistance.

Sensations of Movement. The sensations which accompany unimpeded muscular action or movement are a highly valuable source of information respecting the build of the world about us. As we shall see by and by it is by means of sensations accompanying the movements of a limb, as the arm, or of the whole body, that we come fully to apprehend the position of objects in space.

The sensations of movement afford us this knowledge by reason of certain characters which distinguish them. *(a)* In the first place, the sensations vary in character according to the direction of the movement. The movement effected by one muscle or group of muscles is felt to be unlike that carried out by another. Thus the sensations attending the movements of bending and straightening the right arm, of moving the arm to the right and to the left, are qualitatively unlike. It is this difference in the sensations which lies at the basis of our discrimination of the direction of a movement, and, through this, of our perception of the direction or position of any point in space.

[1] Weights are discriminated more easily when the hand is moved up and down.

These differences may be connected either with the fact that distinct motor nerves are innervated, or with the fact that the sensations of pressure accompanying two movements are qualitatively unlike. Possibly both elements combine in differencing the sensations of movement.

(b) In the second place the sensations of movement are finely distinguishable in respect of duration. In this circumstance they resemble the passive sensations of hearing. Owing to this characteristic we are able, in a way to be explained by and by, to reach distinct perceptions of the velocity and the range or extent of movement performed, and, through these perceptions, of the distance or interval between any two points of space.

The discriminative delicacy characterising motor sensibility or sense of movement has been estimated in the case of the ocular muscles which bring about movements of convergence. Here it is found to be very great. Thus a movement of the eyes (or the optic axes) through an angle of 68 seconds, answering to a contraction of the inner muscle of the eye-ball amounting to about ·004 millimetres, was detected. And a difference in the range of movement, corresponding (on the average) to the fraction $\frac{1}{81}$, was perceptible.

Sensations of Resistance. The sensations which arise when muscular energy is impeded, as when we push with the shoulder or hands against heavy bodies, pull them, lift them, and so on, have a distinct character of their own. They are commonly called sensations of resistance. They exhibit, like those of movement, nice distinctions of degree. We experience a difference of sensation in lifting a pound and 20 ounces, and in throwing a heavy weight a yard and two yards.

Through these muscular sensations (in conjunction with passive sensations of pressure) we reach perceptions of the hardness, density, or inelasticity of bodies. The density of clay, the elasticity of a ball, the hardness of iron, are known by exerting some degree of muscular energy, and not by passive sensations of touch merely. The boy's knowledge of the flexibility of a stick, of the immobility or inertia of a box, of the impenetrability of oak or iron, is clearly based on sensations of impeded muscular energy.

The measurement of the discriminative delicacy of this aspect of the muscular sense (sense of resistance) has been carried out by Fechner with respect to the estimation of weight. His experiments consisted in a series of liftings of weights of different magnitudes by one hand and also by both hands. According to these experiments when a small weight was taken (300 grammes) a difference of $\frac{1}{25}$ was recognised (in a certain proportion of trials). When a heavier weight was taken, the discriminative sensibility showed itself to be finer. As in the case of the passive appreciation of weight by touch, the discrimination by one and the same hand was more delicate than that by the two hands. In these experiments touch-discrimination is of course not eliminated. But a comparison of the results with those which we just now saw to be gained in the case of touch-discrimination alone (apart from muscle-discrimination), shows that we have here to do mainly with muscular sensibility. And this conclusion is borne out by the observations of Leyden and Bernhardt, according to which the sensibility of the skin can be partially or even wholly destroyed without affecting materially the discriminative appreciation of weights.[1]

Relation of Muscular Sense to Touch and Sight. It is plain from this brief account of the Muscular Sense that it holds a special relation to the two senses of Touch and Sight. Each of the organs concerned, the hand and the eye, is a highly mobile organ, supplied with a complex and delicate muscular apparatus. Through the possession of this mobility the organs are able to multiply their impressions. Just as the mobility of the insect's antennæ enables it to

[1] See Wundt, *Physiol. Psychologie*, I., Cap. 8, p. 344.

have many more impressions of touch than it would have if the organs were fixed, so the mobile arm, hand, and fingers of the child greatly extend the range of his passive impressions. By such movements he is able to bring the most sensitive part of the organ (the tips of the fingers) into contact with a wide extent of objects. Similarly the mobility of the eye, by which it is capable of bringing the most sensitive part of the retina, that known as the yellow spot, opposite to a number of objects in succession, greatly increases the sweep of vision.

Another advantage closely connected with this is the capability of a rapid succession of impressions, and that by way of the most sensitive part of the organ. This capability greatly facilitates fine discrimination in the case of these organs. It is by transferring the fingers rapidly from one surface to another (*e.g.*, from a rough to a smooth, from a cold to a warm), that the corresponding qualities are easily distinguished. Similarly it is by passing the eye quickly from one colour to another that the discrimination of colour becomes perfected.

But this perfecting of passive impressions is only one part of the gain resulting from the high degree of mobility of the hand and the eye. Another and no less important part is the added muscular experience which accompanies these movements. This experience, as we shall see in the next chapter, supplies these two senses with the means of ascertaining the position of objects or parts of objects in space. The local discrimination of the skin and retina acquires its importance because of its intimate association with muscular discrimination.

Finally the sensations of resistance clearly have the closest connection with Touch proper. In touching objects we usually exert some degree of muscular force (in pushing, holding, or lifting), so that the muscular sense habitually co-operates with passive Touch.

Owing to the way in which the muscular sense combines with the passive sensibility of touch and sight we may call these two senses Active Senses. By Active Touch and Active Sight will be meant tactual and visual (retinal) sensibility supplemented by the sensibility connected with the muscles by which the sense-organs are moved or urged to move.[1]

Sense-Impressions and Attention. For the production of clear or distinct sensations, whether in respect of degree, quality or local colour, it is not enough that the sense-organ be stimulated. The brain centres must react. Or to speak in psychological language, the mind must react in the form of attention. Only by this means will a sensation rise into the region of clear consciousness.[2]

Discrimination of Sensation. No impression is definite or clear unless it is picked out and distinguished from others. When we are inattentive our minds may be receiving a mass of visual, tactual and other sensations which remain blurred and confused.

[1] I am indebted for the convenient expression 'Active Sense' to Prof. G. Croom Robertson.

[2] On the probable physiological accompaniments of this reaction of attention, see above p. 77.

The direction of attention to any one of them separates it from the adjacent crowd and gives distinctness to it. This fact may also be expressed by saying that it is 'differenced' or discriminated. To have a clear sensation is to have a consciousness of its difference from other sensations accompanying it or immediately preceding it. As we have seen the higher senses admit of much finer differences than the lower. In the case of hearing, two impressions when they immediately follow one another are finely distinguished. And impressions of touch and sight are similarly distinguished in succession by means of the mobility of the organs. Finally in the case of touch and sight two simultaneous impressions may be sharply bounded off one from the other by means of the discriminative local sensibility.

Classing of Sense-impressions. A clear sensation involves not only a singling out of the impression from present surroundings but a connecting of it by way of assimilation with past impressions. In order, for example, to have a definite sensation of a bitter taste, or of a blue colour, the mind must instantly identify it with, or assimilate it to, past sensations of the same sort. This shows that clear sensations involve a germ of retentiveness. They take on a familiar or recognisable character owing to the persistence of traces of past similar sensations. This combination of traces of past sensations with a present one, which always happens in the case of the adult, is seen with special clearness in the case of *faint* impressions. A moment's reflection will tell us that a faint smell, or a feeble sound would not have the definiteness which it has, were it not reinforced by these traces of past impressions.

It is to be noticed however that this classing in its turn involves a further differencing of the present sensation, namely a mental separation of it from *past* unlike sensations. To identify for example the taste of a particular wine I must 'mark it off' from the tastes of other wines. If owing to the faintness of the impression or any other circumstance I could only identify it as the taste of *some* wine, the classing would be a rough one, and this because the discrimination was defective. We may say then that the degree of definiteness of a sensation depends mainly on the nicety with which it is differenced from present and past unlike sensations.

Though discrimination and assimilation are two fundamentally distinct intellectual functions, and vary greatly in their relative strength or perfection in different minds, they are, as has just been illustrated, ordinarly carried on together and in close connection. This is certainly true of the early stage of our intellectual life now considered. The assimilation of a sense-impression always implies some amount of discrimination. But does the discrimination of an impression always involve assimilation? Not quite in the same way. We often begin to be dimly aware of a difference in a sensation or group of sensations before we can assign any definite character to that which differs. Thus we detect a strange or foreign ingredient of flavour in a familiar dish, or of tone in a familiar tune, and yet are wholly unable for a while to say what the intruder is like. Hence perhaps discrimination may be regarded as the earliest and primordial mode of intellectual activity.[1]

Growth of Sense. From the above it follows that there is an improvement of Sense as life advances.

[1] There might be a convenience in distinguishing two excellences of impressions according as they are well discriminated and well identified. Thus we might say that a distinct impression is one which is perfectly distinguished from others (present or past), a clear or definite one, one which is not simply discriminated but perfectly identified.

Although the child has the same sense-organs and the same fundamental modes of sensibility as the man, his sensations are more crude, vague, and ill-defined. The repeated exercise of the senses in connection with attention leads to the gradual differentiation of sense-impressions, and the rendering of them definite in their character. This growth of sense involves two things: *(a)* an increasing power of sense-discrimination, and *(b)* a growth in the power of identifying impressions through the cumulation of 'traces' In other words our senses become more delicate or *acute* in distinguishing impressions, and more quick or *keen* in identifying them.

Discrimination is measured by the smallness of (objective) difference which is just recognisable. Assimilation is best tested by the feebleness of the impression which can be identified. If, as often happens, the impression is mixed up with others, as when a flavour is combined with other flavours, the strength of the assimilative function is measured by its *relative* force, that is to say, the ratio of its intensity to that of the other impressions which accompany and tend to disguise it. The smaller this is, the greater the assimilative capability.

Improvement of Sense-discrimination. As has been said, the discriminative is the more important side of sense. The infant's sensations at first run together, and are not distinguished. The first distinctions (next to that of the pleasurable and painful) are those of degree or quantity. Thus the impressions of light and darkness, of a bright and a dark surface, are distinguished before those of colours. As the senses are exercised, and traces of impressions stored up in the mind, discrimination improves. With respect both to degree and to quality this improvement is gradual, beginning with the detection of broad and striking contrasts, and proceeding to that of finer differences. Thus the contrast of loud and soft, of heavy and light is arrived at long before nice differences of loudness or weight. Similarly the contrast of the reds with the blues is arrived at before the finer differences between the several sorts of red.[1] In this way the senses become more acute with exercise. It is found that practice in the experiments referred to above, for example those which aim at measuring the limits of local discrimination, considerably increases the capability of discrimination.[2]

Differences of Sense-capacity. Striking differences of sense-capacity present themselves among different individuals. These are of several kinds. Thus A may be superior to B in respect of *absolute* sensibility or the quickness of response to stimulus. The tendency to respond to a very weak stimulus, coupled with good retentive or identifying power, would constitute a sense quick or keen in the full meaning of the word. This may be illustrated by the case of an eye that detected a very faintly shining star. Again A and B may differ in the *range* of their sensibility as measured by the strength of stimulus to which

[1] The exact order in which the colours are distinguished is not certain, and probably varies somewhat in the case of different children. M. Perez speaks of a little girl, 50 days old, specially noticing blue, white, and red though seemingly indifferent to others (*Les trois premières années de l'enfant*, p. 90). Prof. Preyer experimented with his little boy at the age of two, and found that he learnt to identify colours on hearing their names in the following order: yellow, red, lilac, green, and blue (*Die Seele des Kindes*, p. 6, &c.).

[2] The varying effects of successive amounts of practice in the discriminative and assimilative power are carefully given by Stumpf, *Tonpsychologie*, § 4, p. 79 *seq.*

the organ can respond. What is commonly called a 'sensitive' person is one whose sense-organs cannot go on responding as the stimulus increases in strength, but become fatigued.

From these differences we must carefully separate inequalities in *discriminative* power. This is the truly intellectual side of sense-capacity. It is found to characterise the more educated and intellectual classes. It stands in no constant relation to the preceding differences. A may be more quickly responsive to a stimulus than B, and may have a wider range of sensibility, and yet not be more discriminative.[1]

These differences of discriminative capacity may be general or special. A may surpass B all round in discrimination. In such a case we are wont to think of the difference as one of intellectual power. On the other hand A may surpass B in some special mode of discriminative sensibility as in colour or tone discrimination. We find numerous and striking differences in both these respects, from colour-blindness or note-deafness up to the finest discriminative sensibility of the painter and musician. This kind of difference is commonly regarded as involving an inequality in the special sense concerned, but not in intellectual power.

These inequalities are partly native and connected with differences in the organs engaged. General discriminative power probably implies from the first a fine organisation of the brain as a whole, whereas good special sensibility is connected rather with original

[1] See Mr. Galton's new work, *Inquiries into Human Faculty and its Development*, Section 'Sensitivity,' and following.

structural excellence of the particular sense-organ concerned. On the other hand not a small part of the superiority of certain individuals (and races) over others in respect of discriminative sensibility is the result of exercise. This is strikingly illustrated in the exceptional delicacy attained by those who have occasion to employ a sense much more than other people. In this way we account for the fine tactual sensibility of the blind, the delicate gustatory sensibility of wine or tea tasters, and so on. It must be remembered however that exercise does not improve capacity to the same extent in all cases. Capability of growth is one of the distinguishing features of individuals. Thus it has been found that the improving effects of practice in distinguishing two points with the skin are not the same in all cases (Wundt, *Physiol. Psychologie*, II., Cap. 11, § 2, p. 13).

APPENDIX.

A fairly complete account of the physiology of the Senses is contained in Prof. Bernstein's *Five Senses of Man.* A detailed classification of the Sensations is to be found in Prof. Bain's *Compendium of Mental Science*, or the larger work *Senses and Intellect* ("Movement Sense and Instinct"). With this may be compared the *résumé* of the facts of Sensation in M. Taine's work, *On Intelligence*, Pt. I., Book III. The results of the more exact research into the quantitative aspects of Sensation may be studied in Prof. Ribot's Volume, *La Psychologie Allemande*, or more fully in Prof. Wundt's work, *Die Grundzüge der physiologischen Psychologie*, 2nd Ed., Vol. I., Chap. VIII. and IX., and Part II., Chap. XI., § 2.

CHAPTER VI.

PERCEPTION.

Sensation and Perception. Sensations, even when discriminated and classed, are not knowledge, but only its raw-material. They become elements of knowledge when the mind refers them to some region of space, that is to say, localises or externalises them. In its complete form this external reference implies the attribution of an impression as a quality to a particular object situated somewhere in space; which object is regarded as external to, or distinct from the mind which perceives it. Thus we refer a sensation of sound of a certain kind to a particular direction in space, say to the right of us, and to a particular object, say to a bell, and in doing so we attribute the quality (or state) of sounding to this object.

This process of localising sensations and referring them to definite objects is known as Perception. Whenever we perceive a thing we are thus attributing some sensation received to an object. To perceive an orange, for example, is to refer a number of sensations of light and shade and colour to an object called an orange. The result of this process, that is to say, the completed psychical product, is called a Percept.

It will at once be seen from this that perception is much more of an act of mind than sensation. In sensation the mind is comparatively passive and recipient; in perception it not only attends to the sensation (or sensations), discriminating and identifying it, but passes from the impression to the object which it indicates or makes known.

The meaning of the word perception, like that of the closely related term sensation, has varied with different writers. In common life we use the expression for almost any kind of knowledge, as when one says "I perceive a similarity between two ideas," or "a connection between premises and conclusion". And earlier thinkers employed the term in much the same way.[1] Recent psychologists, however, restrict the word to that act of the mind by which we discern an external object by way of the Senses. This cognition of outer things is sometimes called External or Sense Perception, to distinguish it from the mind's cognition of its own states which is named Internal Perception.

The best way of defining the relation of Sensation to Perception is a question of some difficulty. Some writers would include the whole intellectual manipulation of a sensation under the head of perception. Thus the discrimination of a sense-impression would be a part of the act of perception.[2] There is some convenience, however, in confining the term perception to the second part of the process, namely, the referring of a sensation to the object-world, or the giving it an objective significance.[3]

This perceptual process, properly so-called, has been variously described as projecting the sensation outwards into the external region; interpreting it as a mark or sign of an objective existence, &c. A common way of describing it is by saying that in perception we are

[1] See Sir W. Hamilton, *Lectures on Metaphysics*, II., XXIV. (p. 93).

[2] Sir W. Hamilton distinguishes between Sensation and Perception in this way. The former is for him (as we have seen) a phenomenon of feeling, while the latter is a process of cognition or intellection. Conceiving the distinction in this way he seeks to establish the proposition that perception and sensation (like knowledge and feeling in general) are always in the inverse ratio of each other. (See *Lectures on Metaphysics*, Vol. II., XXIV.; *cf.* edition of Reid's Works, p. 863,)

[3] For a careful examination of Hamilton's doctrine, and of the relation of sensation to perception, see H. Spencer's *Principles of Psychology*, Vol. II., Pt. VI., Ch. XVIII., §§ 353, 354.

assigning an effect (a sensation) to its cause (an outer object). But this is hardly a correct account of the process in all cases. When for example I have an impression of colour and refer it to an object, say an orange, I do not think of the quality of colour with which I endow the object as the cause of the sensation. The real cause of the sensation is of course the agent known as light which is reflected from the body; but in perceiving an object we do not think of this, and may, indeed, be wholly ignorant of its existence.

Intra-organic and Extra-organic reference of Sensations. All classes of sensations are in some way referred to external things or externalised. The lowest class, the organic sensations, are referred to a part of the organism itself, as when we localise a sensation of burning or tickling in a certain part of the skin. This may be called intra-organic reference of a sensation. It is known as the *localisation* of sensation. In the case of the special senses there is a further extra-organic reference, as when we say we taste sugar, smell a rose, hear a sound to the right of us, and so on. Here the mind does not attend to the sensation as such and localise it, or apprehend its seat, but passes from the subjective phenomenon, the sensation, to the object which it serves to qualify. What is commonly called Perception is this reference of impressions of light, sound, touch, &c., under the form of qualities, as brightness, harshness, hardness, to things external to, that is lying outside the organism.

Perception the Invariable Accompaniment of Sensation. In adult life there never occurs a sensation which, provided it is discriminated from others, is not *at once* referred to an object in space. The reference may be more or less definite and complete. Thus a sound may be referred to a particular object, as a belfry, or only to some unknown object vaguely localised in space. But in a perfect or imperfect form such a reference always takes place. And it takes place so automatically (that is to say without any intention or wish on our part), and so instantaneously, that it is difficult for the student at first to distinguish the act of perception from the mere sensation.

This applies to discriminated sensations. The difference between simply having a sensation and perceiving is best illustrated in the case of vague undiscriminated sensations. We often have sensations of contact, &c., to which we do not attend, and which in consequence are accompanied by little, if any, of the perceptual or localising element. In waking up we may not infrequently distinguish a first stage of vague sensation followed by another of clear discrimination and localisation.

Perception the result of Acquisition. There is every reason to suppose that this simple act of referring impressions to things or objects in space is the result of a long process of acquisition or learning from experience. An infant in the first weeks of life betrays no signs of recognising the bodily seat of his sensations of heat and cold, pressure, and so on. Nor does he show by an appropriate turning of the head that he perceives the direction of a sound, the impression of which he evidently receives. Perception is probably aided from the first by definite inherited tendencies; but it is only fully developed by the aid of individual experience.

Perceptual Process Analysed. When on hearing a particular sound we say 'A bell is sounding in such or such a direction,' we discriminate and identify the sensation. This is obviously the first stage of the process. If we had never had an impression before similar to this in some respect we could not now refer it to a particular portion of space or to a definite kind of object.

The second stage, that of perception proper, involves the recalling of other sense-impressions besides that of the bell-sound. As will be shown more fully by and by, when we say (on the ground of an auditory sensation alone) 'we hear a bell,' it is because in our past experience this particular sensation of hearing has become conjoined, co-ordinated, or associated with other unlike sensations, more particularly touch and sight sensations, passive and active. If we had never handled or seen a bell before, the present sensation would not be referred to such an object. The percept is thus the result of a process of grouping. It is a complex psychical phenomenon, of which the parts or elements are sensations.

It is to be noticed that this grouping of sense-elements involves a germ of *representation*. The tactual and visual sensations answering to the feel and look of the bell are not actually present when we hear it and recognise it by the sound. They are revived, recalled or reproduced. In referring the impression of sound to the bell we are mentally representing, picturing or imagining the look and feel of the bell. A part at least of our meaning in saying that we hear a bell in such a direction or at such a distance is that we know we might move in a particular way, say to the right, and come in view of, and into contact with, the bell, that is to say, renew these visual and tactual experiences. Hence perception has been described as "a presentative representative process"[1] It contains not only a presentative element, the actual sensation of the moment, but also a mass of representative elements, picturings of sights and touches.

Some writers do not seem to regard the presence of a representative element as essential to perception. Thus Prof. Wundt regards a complete presentation (Vorstellung) as differing from a mere sensation simply by its complexity. Hence a series of sound-sensations apprehended in their time-order constitutes a *Vorstellung*.[2] It may however be said that even here the *perception* of the sounds as external, that is to say, travelling from a certain direction of space, implies a reference to touch-experience.

Since in perception the mind thus passes from an actual sense-impression to the representation of other sense-experiences (movements and attendant sensations), it bears a certain analogy to a process of inference. Thus by a little forcing of language we may be said in hearing the bell to infer the possibility of certain touch and sight experiences. Accordingly some writers have not hesitated to describe the process as one of "unconscious inference."[3]

Yet while thus connecting perception with higher intellectual processes, we must not lose sight of the difference between the two. The perception of an object as presented to us at the moment takes the form (in our consciousness) of an immediate cognition or 'intuition,' as distinguished from a mediate cognition or inference. In other words, the percept involves the immediate assurance of the presence of the whole object. Hence psychologists commonly speak of percepts in their totality as *presentations*. And by so doing, they mark them off from those mental states which are purely and manifestly representative, namely, images and ideas.

Definition of Perception. By aid of the foregoing brief analysis we may define perception as follows. Perception is a complex mental act or process, involving presentative and representative elements. More particularly, perception is that process by which the

[1] By Mr. Spencer, *Principles of Psychology*, Vol. II., Part VIII., Chap. II., p. 513.

[2] *Physiol. Psychologie*, II., Cap. 11, § 1; Cap. 12, § 1.

[3] See my work, *Illusions*, p. 22; *cf.* Stumpf, *Tonpsychologie*, p. 90.

mind, after discriminating and identifying a sense-impression (simple or complex), supplements it by an accompaniment or escort of revived sensations, the whole aggregate of actual and revived sensations being solidified or 'integrated' into the form of a percept, that is, an apparently immediate apprehension or cognition of an object now present in a particular locality or region of space. This definition may be accepted provisionally. We shall be better able to judge of its appropriateness after we have analysed the perceptual process more fully.

It will be seen from the above that perception is essentially a process of grouping. It is the simplest form of the combination of psychical elements in a complex whole. Since the combination of elements (*e.g.*, sound, touch, and sight of the bell) depends on the past connection of the experiences *in time* (either as simultaneous, or as successive), it is customary to speak of the process as an illustration of the Law of Contiguous Association, which will be fully expounded in the next chapter. It is, however, important to note that the process of association here assumes a peculiar form. Instead of distinct psychical states succeeding one another, as in the case of what is known as the association of ideas, we have an apparently simultaneous occurrence of a mass of psychical phenomena inseparably fused together.

Physiological Conditions of Perception. Just as perception is more complex than sensation, so the nervous concomitants are (presumably) more complex in the first instance than in the second. Thus since perception is a reaction of the mind on a sense-impression it would seem to involve in a special manner the centres of Attention. Again, inasmuch as it includes the grouping of (disparate) sensations, those of sight, touch, &c., it may be said to have as its further physiological condition the co-ordination of different nerve-centres, optic centre, tactual centre, and so on. This grouping embraces not only sensory but motor centres. As we shall see later on, perception contains an active (motor) element. The process of grouping appears to be effected by certain higher and more complex centres.[1]

[1] See Dr. Maudsley, *Physiology of Mind*, Chap. IV. The difficult task of assigning the nervous concomitants of perception has recently been attempted by Prof. G. Sergi (*Teoria Fisiologica della Percezione*), who lays emphasis on the co-operation of an outgoing nervous process.

Special Channels of Perception. It has been observed that every sensation is interpreted by an act of perception, or, in other words, is worked up as an element into that compound mental state which we call a percept. Thus we refer sensations of smell to objects as when one says 'I smell violets,' just as we refer sensations of light and colour to objects as when one says 'I see a candle'. Nevertheless when we talk of perceiving we generally refer to knowledge gained at the time through one of the higher senses, and more particularly sight. To perceive a thing means in everyday parlance to see it. Where sight is wanting touch assumes the function of the leading perceptual sense. Sight and touch are thus in a special manner channels of perception.

Touch and Sight as Sources of Knowledge. The reason why the senses of Touch and Sight are thus distinguished has been hinted at in the previous chapter. We there saw that they were marked off from the other senses by having local discrimination and an accompaniment of muscular sensation. Owing to these circumstances these two senses supply us with a wider and more varied knowledge of objects than the other senses. In smelling a flower I can only apprehend one aspect or quality of a thing, its odour: in looking at it I instantly take in a number of aspects, as its colour, shape, and size.

The additional knowledge gained by means of local discrimination and movement is moreover of a most important kind. To begin with, what we mean by perception in its simplest form is externalising or referring a sensation to a point in space. Now it is only touch and sight which give us any direct knowledge of space, of the situation of objects with reference to one another and to ourselves. In hearing, as we shall see by and by, we find out the direction and distance of an object (so far as we find them out at all) in a circuitous way.

Again touch and sight directly make known to us the space-qualities of bodies, figure and size, and this they do by help of local discrimination supplemented by movement. With these 'geometrical' or space properties of bodies must be coupled the 'mechanical' or force properties, resistance under its several forms of hardness, weight, &c., as made known by active touch.

These qualities are of much greater importance than those made known by the other senses, such as the taste or flavour of a substance and the sound or sonorousness of a body. We know more about an object when we have ascertained its shape or size than when we have heard its sound.

The superior importance of such qualities as size, figure, and weight turns on a number of considerations. To begin with, all objects have some sort of figure, size, and so on. What we mean by a *thing* or a material body is something made up of figure, size, hardness and weight, &c. On the other hand there are many things which have little or no smell or taste. Again, the former qualities are comparatively speaking constant or unchanging in the case of the same object. A stone is always the same as to its size, hardness and weight. On the other hand a body is only sonorous when put into a particular condition of vibration, and a fragrant body varies considerably in the degree of its fragrance according to circumstances. Finally, different persons agree very much more respecting the size or weight of an object than respecting its taste or smell: the former impressions vary less with the state of the individual organ than the latter. Hence the former aspects of objects have been erected into a higher class under the name of 'Primary Qualities,' while the latter have been marked off as 'Secondary Qualities'.[1]

Tactual Perception. Although, as has been observed, we commonly mean by perception visual perception, touch (by which we mean active touch) must be regarded as an important channel of perception, especially in early life. As we have seen, we obtain by means of this sense the largest amount of important knowledge respecting objects. The bulk, figure, hardness, weight of a thing are directly known to touch. Hardness and weight are known only to this sense, and these qualities are obviously an important part of what we call *material* objects, or bodies. Hence touch seems to bring us into the closest relation to external things. It is for all of us the sense to which we make appeal when we want to be *certain* of a thing being present. We call a thing, of whose reality we are sure, something 'tangible'. In order to understand what we can know of things through touch alone we must of course suppose sight away as in the case of the blind.

Tactual Perception of Space. As already observed, touch gives us direct knowledge of space, of the position of points both in our own organism and in external bodies. By this sense we apprehend immediately where objects lie relatively to one another and to our-

[1] The distinction here touched on has played a prominent part in philosophical discussions respecting the real nature of external objects. (See Sir W. Hamilton's Edition of Reid's works, note D). For a full account of the psychological distinction see Mr. Spencer's *Principles of Psychology,* II., Pt. VI., Chap. XI., and following.

selves, and what is their size and figure. We have now to examine how these perceptions are built up. Let us try to retrace the steps by which a blind child would explore the world about him, or rather that part of it which is directly accessible to him.

Perception of the Situation of Objects through Movement. It has already been observed that *passive* touch is inadequate to give us knowledge of space. The local discrimination connected with the distinctness of the tactual nerve-elements would convey no local knowledge, no information about the position of points in space. In order to this, the *active* experiences of movement are necessary. It is the moving hand of the child which finds out the situation of things in space.

In order to understand the help given by movement we will imagine that the child has only one finger-tip and not an extended hand, and so is able to have only one tactual sensation at a time. This sensitive point he can carry about just as the insect can carry its antennæ from one object to another.

Every movement from point to point of space which the child thus performs is accompanied by a definite and distinct series of 'sensations of movement' which series as a whole underlies his consciousness or perception of that movement. The character of this series of sensations will vary according to the direction of the movement. Thus in carrying his finger from his breast to a point a little in front of him, say the edge of a table, he has a distinctly marked series of sensations. These several sensations answer to the successive positions of the moving organ. A movement having a range of two feet has a different series from that of another movement of the same direction having only half this range. The final sensation answering to the position of the limb when brought to a stand-still, supplemented by the representation of the preceding members of the series, may be said to supply the materials for a rudimentary *perception* of a movement of a given direction and range.

The series of sensations here referred to is a complex one made up of a succession of 'sensations of innervation' and of another of sensations of contraction. These last again probably include, as we have seen, sensations arising directly from changing conditions (degrees of contraction) of the muscles, and from accompanying changes in the tension of the skin, &c. The sensations of innervation constitute a uniform state of mind, though there are appreciable differences of *degree* at different stages of the movement. The sensations of contraction vary in a more marked way from point to point. The sensation by which we know the position of the moving organ at any moment is partly one of innervation (in so far as the limb is held in that position) and partly one of contraction.

This series of sensations becomes solidified, and the resulting perception more complete, by repetitions of the movement. Each time the child executes this particular movement he experiences the same sequence of sensations. This series becomes distinct by variation of experience, that is to say by executing other movements having a different direction, a different extent, or both.

All this time, however, there can only be a very vague perception of space as made up of coexisting points or positions. The perception becomes more clear in different ways. For one thing, changes in velocity are important. By varying the pace of the movement the child finds that the duration of the several distinguishable sensations, and of the series as a whole, becomes shorter or longer. The interval between the initial and final sensations, answering to the initial and final positions of the limb, increases or decreases according to the amount of energy thrown into the muscles. In this way the series would come to be recognised as a fixed order in time, the duration of which can be varied indefinitely.

A new and much more important element is added to the perception of coexistence or coadjacent points by the experience of reversing the movement. In carrying his finger from a point B in front of him to his starting point A, his own body, the child has a different experience. New muscles are called into play, and those previously engaged are relaxed. At the same time the sensations answering to the successive positions of the hand are the same as before, only the order is reversed.[1]

By innumerable repetitions of this complementary pair of movements, together with other complementary pairs corresponding to other points of space, the child would gradually learn to map out the several regions immediately environing him, to localise objects relatively to the position of his own body at any moment, as well as to the positions of other external objects.

By aid of the movements of the two arms, and still more by help of leg-movements or locomotion

[1] These would include, in addition to the sensations experienced in passive movement, as when a person bends our arm, we not resisting, other sensations corresponding to the relative degrees of tension of the opposing muscles.

the range of this tactual exploration would be greatly enlarged. Our imaginary blind child walking about the room and feeling out towards this and that object would gradually piece together, so to speak, a number of regions of space answering to different positions of his own body.

The ascertaining of a fixed spatial order among objects supposes that certain objects are at rest or occupy the same position. So long as the child does not move, the position of his own body would be the point of reference. In moving about however, this position varies, and then the situation of any object must be estimated relatively to that of some other object supposed to be fixed. The changes in the position of objects, such as the chairs, &c., would be ascertained in the same way.

Perception of Form and Size through Movement. In very much the same way as he finds out the relative situations of different objects, such as the several pieces of furniture in a room, the child might discover the shape and size of an object. Thus he could pass his finger over a person's face in different directions. In so doing he would have not only two tactual sensations at the beginning and end of his excursion, as he had before, but an unbroken series of tactual sensations accompanying the series of motor sensations. By varying the velocity of the movement, by reversing it, and by executing a number of movements in different directions, he would arrive at a rudimentary perception of a fixed order of tangible points or an extended surface. The range of this touch-accompanied movement in different directions would give him a knowledge of the figure and size of this surface. This perception would be rendered still more distinct by passing the finger along the outline or contour of the surface.

In this way some knowledge of space-relations might be obtained by movement alone. What this would amount to, it is impossible for us to conceive. Everybody's tactual acquaintance with space is gained by way of an extended surface, the hand. Let us now enquire how this second important property of the tactual organ aids in the acquisition of this knowledge.

Tactual Perception proper. At first the blind child when touching a surface with his outspread hand would have no distinct knowledge of the locality of the several impressions. Though these are somehow distinct from one another from the beginning, yet this distinctness is not at first interpreted as a local or spatial difference. Thus the child does not know that one finger is situated in a particular region relatively to the thumb. This knowledge is acquired by means of movement.

Interpretation of Local Character of Sensations by Movement. In order to understand this let us now conceive our blind child to move not his finger-tip merely but his open hand. Suppose he moves his hand over a fixed point, say the tip of a stick or pencil. He now has a series of motor sensations and a perception of movement, and at the same time a series of touch-sensations received by way of distinct nerve-fibres, and therefore having unlike local characters. Thus he has the series of touch-sensations answering to thumb, first, second, third, and fourth fingers. Let us represent the local characters of these by the symbols 1, 2, 3, 4, 5. Every time he moves his hand this way he has the same order 1, 2, 3, 4, 5, the succession being more or less rapid according to the amount of energy thrown into the movement and its resulting velocity. A reverse movement gives the same series of local characters, only in a reverse order, 5, 4, 3, 2, 1. By repeating these movements again and again the child gradually finds out that a touch-sensation of a particular local quality, say 5, has a definite fixed position in the series, that a certain kind and amount of movement[1] is always necessary before 5 follows 1. When this stage is reached the sensations having the character 5 are localised relatively to those having the character 1, &c.

By varying this movement, that is to say, by carrying the hand over the point in other directions, the sensations having the local quality 5 would be localised relatively to those of other points of the hand. Thus sensations received by way of the tip of the 4th finger and having the local character $5a$, would be defined relatively to those received by way of a point at one of the joints and having the local character $5b$; and so on of the rest. In this manner the sensations received by way of all the several parts of the hand would be gradually localised relatively to one another, in other words, they would be ordered in space.

Simultaneous Perceptions of Points. Intuition of Surface. When this stage is reached the tactual perception of space is perfected by means of a simultaneous group of touch-sensations. The child laying his outspread hand over a surface, as the face of a stranger,

[1] The amount of movement is of course determined by the product of its duration into its velocity. The velocity being the same, the duration is all that need be considered.

would receive at one and the same moment a number of touch-impressions having distinct local references. Thus the impression corresponding to the lips would instantly be localised with reference to that corresponding to the tip of the nose, each of the eye-brows, and so on. By such a simultaneous group of touch-sensations the knowledge of space as made up of coexistent parts would be rendered far more distinct.[1] Indeed, it may be safely asserted that our little explorer would, by aid of this experience of a multitude of sensations of contact with their several motor suggestions at one and the same moment, reach a new *kind* of space-perception. For the first time the space-order would now be clearly differenced from a mere time-order, or a renewable and variable *succession.* In other words, the tactual perception of space is a product of two factors, movement and muscular sensation, and a plurality of sensations of contact, distinguished from the beginning by different local characters, and so capable of taking on distinct associations of movement.

By using the two outspread hands a much more extensive range of simultaneous space-apprehension would be possible. Again, by passing the outspread hand or hands over a large surface, as a wall, a succession of such simultaneous perceptions would be obtained. By varying these successions the several regions thus apprehended by distinct simultaneous perceptions would be joined together, and so a more extended representation acquired.

[1] It is not implied here that there is a perfectly simultaneous *attention* to these several impressions at any one moment. It is enough that the impressions are simultaneously presented, and that the attention can rapidly pass from one to the other, while those not directly attended to are still obscurely detected. This is well brought out in the similar case of retinal perception by Mr. H. Spencer, *Principles of Psychology,* Vol. II., Pt. VI., Chap. XIV., p. 184, &c.

The ordering of touch-sensations of the hand in space is effected not only by means of this member's own movements but also by means of movements of the other hand over its surface. The child finds out the relative position of finger and thumb, finger-tip and finger-joint, &c., of each hand by passing the fingers of the other hand over these parts. That is to say he explores the surface of his own body just like the surface of an external or foreign object. This factor in localisation will be dealt with more fully presently.[1]

It is important to add that the tactual perception of space includes the apprehension of the third dimension, depth or distance from the observer, as well as the two surface dimensions. In moving the hands away from and towards the body the child discovers the direction and distance of objects relatively to this starting-point. Similarly by passing his hand along a receding object, say the horizontal surface of a table, he would acquire a perception of its several parts as nearer and further, advancing and receding.

Perception of Solidity. Finally he could obtain a perception of a solid body, that is an object having bulk and not merely surface, by simultaneous tactual perception. Thus if the object is very small, as a ruler, he can grasp it with one hand; if larger, as a

[1] The fundamental idea here expounded that the localisation of touch-impressions and the tactual perception of space is acquired by help of the experience of movement may be said to underlie all recent attempts to trace the genesis of the space-perception. This applies not only to the theories of Prof. Bain (*Senses and Intellect* 'Sense of Touch,' p. 181, &c.) and Mr. H. Spencer (*Principles of Psychology*, II., Pt. VI., Chap. XIII.), but also to German theories, such as Lotze's doctrine of Local Signs in its later and more developed form, and Wundt's theory of a synthesis of skin and muscular sensations. (See Lotze, *Metaphysic*, Bk. III., Chap. IV.; Wundt, *Phys. Psychol.*, II., Cap. II., § 5.) It is to be added that the German psychologists rightly emphasize the part played in the development of the perception of space, by the extended surface of the skin, with its capability of yielding us at the same moment a number of locally distinct sensations (see especially Wundt, *loc. cit.*, p. 34).

ball, he can clasp it between his two hands; if still larger, as a cushion, he can fold it within his arms.[1] In so doing he experiences a multitude of touch-sensations which are instantly localised with reference one to another. Along with these he has a number of sensations of contraction which immediately make known to him the bent position of his hands and arms. And thus he reaches at once a clear perception of the object as a solid or cubical body, having a certain figure and size (bulk) as a whole.

Perception of Single Things and of a Number. At first there would be no clear discrimination between a single object and a number of objects. Continuous quantity or magnitude, and discrete quantity or number, would impress the child's mind in much the same way. The one perception would be gradually differentiated from the other by the recognition of certain marks. One and the same surface would allow of a continuous movement accompanied by touch, and of continuous simultaneous series of tactual sensation (when the hand was spread over it). A plurality of objects, as a row of bricks, would be distinguished by an interruption of the tactual sensation in the case of movement, and by the discontinuity of the series of sensations of contact in the case of the hand at rest.[2] Experience would aid in the discrimination by supplying a knowledge of the relative positions of

[1] If the object were a very large one, as a table, this simultaneous apprehension of its several parts as those of a solid body, would of course be impossible. Its solidity in that case could only be perceived by the aid of locomotion, and a succession of touch-perceptions.

[2] The full experience corresponding to a perception of a single object would include the ability to move away from a point back again to the same point without losing the sensation of contact, and without reversing the movement.

points of the bodily surface, and of the alterations of these by movements of the organs. In this way the child would learn to interpret the double sensation of contact of the two hands brought close to one another as answering to one solid object. On the other hand, he would in general ascribe simultaneous impressions of contact by way of the palm and the back of the hand to two objects.[1] This tendency again would be checked in certain cases by a fuller knowledge of the figure of bodies. Thus the child would discover that a concave surface, as the inner surface of a basin, could simultaneously come into contact with the outer surfaces of the thumb and fourth finger.

Perception of Moving Objects. Along with these perceptions of space, and of one and many objects in space, the child would gain the perception of things as moving, or as changing their position. This would take place by following the moving object with the hand.[2] The perception of 'objective,' as distinguished from 'subjective movement' (that is to say, of the movement of the object, and not simply of the hand), would be based on the persistence of *one* touch-sensation (as distinguished from a series of unlike ones, as in the case of moving the hand over a surface[3]); and

[1] This tendency is illustrated in the familiar experiment of crossing the third and the fourth finger and placing a marble between them. Under these circumstances we seem to be touching *two* objects. (For an explanation of this error, see my work on *Illusions*, p. 72).

[2] It might also be ascertained (later on) by a succession of sensations of contact, as when a second person stroked the child's hand or face.

[3] The experience of following a moving object would be marked off from that of passing over a smooth surface by the absence of the sensations connected with the rubbing or friction.

also on the recognition that the direction and velocity of the movement were determined for him but not by him. The full recognition of the movement as such, would only arise after the tactual space-perception had been developed. It would then be recognised as a movement in space, from one point to another.

Perception of Temperature. By means of Touch we obtain a knowledge not only of the situation of an object in space, its form and its magnitude, but also of other qualities. Of these temperature is the simplest quality. By touching a stone, a piece of cloth, a human hand, and so on, a child distinguishes degrees of temperature and refers corresponding degrees of heat (or 'cold') to the objects. The knowledge of 'objective' temperature, however, gained in this way, is very uncertain. As observed in the preceding chapter, our sensations of temperature vary considerably according to the 'subjective' temperature, that is, the degree of heat of the part of the body which touches, or (more correctly) the relation of this to the temperature of the surface touched. We have continually to verify our subjective impressions of temperature by comparing them with those of others, and by resorting to physical tests.

Perception of Hardness and Softness. Of more importance than the knowledge of this secondary and highly variable quality is that of hardness and softness, elasticity and inelasticity, weight, and roughness and smoothness, in their varying degrees. The recognition of these qualities, unlike that of temperature, involves a variety of sensations. They are perceptions reached by way of Active Touch. Thus it is plain that a child learns the several degrees of hardness of objects by exerting muscular energy in pressing, squeezing, and pushing against them. In so doing, however, he receives touch-sensations proper as well. The recognition of a certain degree of hardness or inelasticity is based on the relation between these experiences. If the substance is a soft one, as clay, the exertion of force is followed by little increase of sensation of pressure: it yields to the force, and there is a certain amount of movement. On the other hand, if the substance is a harder one, as wood, increase of exertion is followed by increase in the intensity of the sensation of pressure, and little if any movement.

Perception of Weight. In like manner the perception of weight involves experiences of Active Touch.[1] We usually estimate the weight of a substance by lifting it in the hand. The heavier the body, the greater will be the degree of nervous energy expended in sustaining it, and the greater the attendant tactual sensation of pressure. The co-operation of this last with muscular sensation is seen conspicuously in lifting a body by means of a string, when the difference of pressure makes itself felt by distinctly painful sensations of various intensities.

Perception of Roughness and Smoothness of Surface. Lastly we have the perception of roughness and smoothness of surface in their various degrees. The roughness of a surface, as that of a piece of undressed

[1] This is usually the case, though when the objects are not very heavy their weight may be appreciated by sensations of pressure alone, as when the hand is laid on the table and light weights placed on the hand.

stone, may be recognised to some extent by merely laying the outspread hand on the surface. In this case the perception of roughness arises by means of the different intensities of the sensations of pressure received by way of different points of the hand, and definitely localised in these points. This experience at once suggests inequalities of surface, projecting and receding points. But the perception is much more distinct when the hand moves over the surface. In this case all the little unevennesses are made known as impediments to movement. Such a rough surface offers resistance to movement, whereas the hand glides easily over a smooth surface as that of marble.

With these perceptions of hardness of substance and weight of bodies are closely connected those of resisting force, whether of a body at rest or in motion. Thus in trying to move a heavy body as a table, a boy estimates its inertia or resisting force by the degree of muscular exertion made, together with its effects, whether there be no movement accompanied by certain intense sensations of pressure, or a movement of a certain rapidity, accompanied by less intense sensations of pressure. Similarly in the case of estimating momentum, as when a boy tries to stop another boy running, or a football.

It is to be observed that the essential nature of perception as a presentative-representative process is illustrated even in these apparently direct perceptions. Thus after appreciating weight by active touch, the passive tactual experience will be enough to call up the corresponding muscular experience. Similarly after gaining a complete perception of roughness or smoothness by the aid of movement, mere contact of the hand with the surface will suggest this fuller active experience. Thus throughout, in respect of qualities like hardness, weight, &c., as well as of geometrical qualities (figure and magnitude), tactual perception involves an element of representation.

7 **Tactual Intuition of Things.** By means of these several tactual perceptions a blind child is able to obtain distinct intuitions of things. Thus in handling a piece of iron he has one group of sensations (of temperature, weight, roughness, &c.), while in taking up a piece of wood he has another group. The several sensations of each group must first be distinguished one from another, and the corresponding perceptions of definite qualities (smoothness, weight, &c.) arise in the mind; after this the group as a whole is distinguished from other groups. By ascertaining the shape, magnitude, weight, temperature, &c., of each individual object, and each kind of object, as an orange, a key, our imaginary blind child would acquire a wide grasp of its distinctive characters or qualities.

The perception of the object as a thing persisting in space implies repeated tactual perceptions. Every time our supposed blind child handles a particular object, as his toy-horse, his cat, and so on, he has the same aggregate of sensations or perceives the same assemblage of qualities. And it is this recurrence of a perfectly similar group of tactual experiences which would supply him with a basis for the recognition of the thing as persisting, as remaining one and the same (whether or not in the same locality). A lesser amount of resemblance in the group of tactual experiences supplies the ground of recognising a thing as one of a kind, as an orange or a book.

Finally, in thus identifying the group of tactile properties the child would apprehend the presence of a whole object with its other qualities not directly presented to sense at the moment. Thus in touching an orange he would by means of the complex of touch-experiences identify the object as an *orange*, that is to say an object with a particular taste; in touching a bell he would similarly identify the object throughout, in respect of its sound as well as its tactile qualities. Observation of the blind shows that these tactual intuitions of things are capable of being highly developed in respect of discriminative fineness and of rapidity.[1]

Tactual and Visual Perception. The above brief account of tactual perception may suffice to indicate its peculiar character. It is the most direct mode of apprehending things. The presentative element is large in proportion to the representative. On the other hand it is limited in its range at any one moment. Our imaginary blind child would only be able to seize with his mind directly at any one time a small portion of the external world, namely those objects which were within his reach and capable of being simultaneously touched.

Visual perception stands in marked contrast to this direct but limited mode of apprehension. In normal

[1] It is not meant by this that a child has a distinct idea of a quality before he apprehends a thing. The idea of a quality implies that of a thing as the 'substance' in which the quality inheres, and cannot therefore be attained before the thing is apprehended. The idea of weight, roundness of form, and so on, is, as we shall see later, an abstract idea and only gained after objects have been compared under certain common aspects. What is meant in the above is that the child intuits a thing as such only by means of a certain recurring group of sense-experiences. These, when afterwards reflected on, are consciously taken up into the idea of so many qualities.

circumstances seeing is, as has been remarked, the dominant mode of perception. It greatly transcends touching in the range of its grasp of external things. Thus in vision we apprehend objects not only near us, but at vast distances from us, such as the heavenly bodies. Again, by sight we are capable of apprehending in a single moment a wide group of objects in different directions and at different distances from us, that is to say a whole region of the external world.

The predominance of visual perception is illustrated by a number of facts. In smelling, tasting, or touching an object which we do not see, the corresponding visual presentation (visual form with colour more or less distinct) is instantly recalled. Similarly a word always suggests to our mind first of all, and most irresistibly, the visual appearance of a thing. And this holds good with respect to objects which are of most interest to us in relation to other senses. Thus the word 'bell' calls up the bell-form before the bell-sound, the word 'orange,' the particular form and colour of the fruit before its taste.

The full significance of sight is brought out by the modern theory of vision, named after its founder Bishop Berkeley, the Berkeleian. According to this view, this sense derives much of its apparently direct knowledge of external things from touch. That is to say, the visual perception of space is representative in that it gathers up and symbolises the more direct tactual perception. This characteristic of vision, though often regarded as a defect, may be viewed as its peculiar excellence. It is only because it can thus embody and signify the results of active touch that sight is fitted to take the lead as the channel of perception.

Visual Perception of Space. Here, as in the case of touch, the local discriminative sensibility (of the retina) would not suffice to give us a knowledge of space. This must be supplemented by experiences of movement. In order to understand the visual perception of space we must first enquire into the nature of these motor experiences. And for the sake of simplifying the problem we will suppose that a child has but one eye, and that this eye has but one sensitive point, the yellow spot or area of perfect vision.

Perception by Ocular Movement. The eye is moved or rolled about its centre by a system of six muscles.[1] These movements tend to bring the yellow spot opposite to different points of the field. This is commonly described as turning or directing the optic axis from one point to another.[2] In performing any particular movement the child has a series of sensations analogous to those experienced in carrying the finger-tips from point to point of space. Thus in moving the axis from a point A in the field of vision to a point B to the right of it he would experience a series of sensations of movement of a definite character. Here too the final sensation, answering to the position of the eye at the close of the movement, supplemented by the representation of the preceding members of the series, would supply materials for a rudimentary perception of movement of a particular direction and range.[3]

[1] I have given some of the results of recent inquiries into the laws of ocular movement in an article on *The Question of Visual Perception in Germany*, in *Mind*, Vol. III. (1878), p. 5, &c.

[2] The optic axis is the principal axis running from the yellow spot through the centre of the eye (more correctly a point very near the centre).

[3] According to Wundt, the motor sensations which accompany ocular movement, like those which attend manual movement, include skin-sensations of pressure, namely, those resulting from the varying pressures on the sensitive parts of the orbit which attend the movement.

By repeating the series, by varying its rapidity, by reversing it, and finally by carrying out a variety of such pairs of movements in different directions, the perceptions of movement in a definite region of space would gradually gain in distinctness as in the case of manual movement.

In this way the child might explore the field of vision or map out the several positions of points on a surface, or in space of two dimensions. In a similar manner he could pass the optic axis over the surface of a body in different directions, and so obtain, by means of numerous series of motor sensations with the concomitant trains of retinal sensations, a perception of its extension and the form and magnitude of the surface. Thus he might pass his eye from the centre of a circular body, as a wheel, to various points of the circumference. These movements might be supplemented by a movement along the contour (the circumference). By numerous movements of this kind he would arrive at some knowledge of the particular form and distinguish this from other forms.

Simultaneous Retinal Perception. Let us now suppose the child's eye to be supplied with its extended retinal surface, and its innumerable nerve-elements. By means of this structure he would, with the eye at rest, receive simultaneously a large number of distinct visual impressions, which would from the first have their several local characters or colourings. These differences, however, would only be interpreted by the aid of movement of the eye's axis over the field of vision. Owing to the presence of the retina the child in performing these excursions would not instantly lose sight of a point as soon as the eye passed on to another. He would continue to see it in what is called indirect vision after 'fixating' it or looking at it directly. For example in moving from the centre to a point on the circumference of the wheel, the retinal image of the former point would slide over a succession of retinal points. That is to say the child would continue to receive the impression of this point (with decreasing degrees of distinctness), varied, however, by a succession of distinct accompaniments in the shape of local characters. In like manner the point of the circumference towards which he was moving would be seen 'indirectly' (with increasing degrees of distinctness) before the eye was fixed on it in 'direct' vision.

This conjoined experience of ocular movement and of varying (retinal) impression would lead to the ordering of visual sensations in space much in the same way as in the case of manual movement. Let us imagine any point P lying on the retina to the right of the centre C and having a local colouring π. Whenever P was stimulated the child would find by trial that a movement of a certain kind (direction and range) was necessary before this impression could be received with perfect distinctness by way of C. In other words the point of the field seen indirectly by way of P can only be seen directly by way of C by means of a movement of a certain kind (to the left, and of a certain range).

After innumerable experiences of this kind the child learns automatically to localise any impression having the local character π, with reference to C. On receiving one such impression there is a tendency to move the eye in the required direction. Thus on seeing a light enter the room to the left of the field he tends to move his eyes (or his head) a certain distance to the left. This shows that impressions having the particular local colouring connected with this nerve-element are now accompanied by a representation of the movement necessary to a fuller realisation of them in direct vision. In other words all sensations having the mark π are now localised in the field in relation to the centre of the field.

Through numberless variations of these movements in different directions, visual impressions of all shades of local colouring would be similarly localised with reference to the central point of the field, and also with reference to one another. The child is now able with his eye at rest to apprehend or take in simultaneously an extended field of objects, the various points of which are instantly localised, one above or below another, to the right or to the left of it, and at a certain distance from it.

When this stage has been reached the child will be able further to recognise the form of any object 'at a glance' by fixing the eye on it. Thus the wheel would be at once seen to be a round object by the eye at rest. And this instantaneous perception of roundness would be due to the circumstance that the retinal impressions answering to the several points of the circular outline of the object are now automatically localised, or referred to the proper points in the field. Similarly the magnitude of an object could be instantly apprehended. The size or 'extensive magnitude' of the retinal image would now serve to suggest instantly the amount of movement required for carrying the eye along the contour or outline.[1]

Perception of Visual Magnitude and Form. The fineness of the local discrimination of the retina and of the muscular sensibility which is so closely associated with this allows of a much more minute and exact perception of magnitude and figure than is attained, under normal circumstances at least, in the case of touch. The eye can delicately appreciate linear magnitude, and distinguish with great fineness a difference in the length of two lines. And by help of this appreciation of linear magnitude that of superficial magnitude is rendered exact.[2]

It is ascertained that the finest appreciation of linear magnitude by the eye is only possible by aid of movement. It has been shown, too, that the comparison of the magnitudes of two lines is most exact when the lines are parallel. Helmholtz accounts for this phenomenon by the fact that in this case the compared objects are successively imaged on the same series of retinal elements.[3]

The visual appreciation of (superficial) form is no less delicate than that of magnitude. A form is

[1] It must not be supposed that this localisation of retinal sensations goes on with equal rapidity at all parts of the organ. As we have seen, local discrimination loses in fineness as we go from the centre to the periphery of the retina; and it has been proved (by Kries, Auerbach, and Charpentier) that the reaction-time in indirect, is longer than in direct, vision, and increases with the distance from the centre, of the region acted upon. (Quoted by Buccola, *La Legge del Tempo nei Fenomeni del Pensiero*, Ch. VIII., pp. 227, 228).

[2] This applies not only to the visual measurement of a rectilinear figure, but also to the appreciation of the dimensions (in different directions) of a curvilinear figure, as a circle or ellipse.

[3] This answers to the fact already touched on, that the discrimination of degree of pressure by the skin is finer when the same region is taken than when different regions are taken (see above, p. 123). The fineness of the visual estimation of magnitude, and the errors incident to this mode of perception, are fully illustrated by Wundt, *Physiol. Psychologie*, Vol. II., Cap. 13 3.

constituted by the relative positions of its several parts, and more particularly by the character or arrangement of its boundary lines making up its outline or contour. Here the first element entering into the perception is the discrimination of the direction of lines, which shares in the delicacy of that of linear magnitude. The appreciation of contour in the case of a rectilinear figure, as that of an oblong or triangle, proceeds by noting the exact direction of each of the lines, as well as the amount of change of direction at the corners (magnitude of the angles). Or, if the figure be a curvilinear one, the appreciation of contour is based on the perception of continual change of direction, and of the rapidity of these changes (degree of curvature).

The other principal element involved in the appreciation of form is relative magnitude or proportion among dimensions. In ordinary vision we do not note with any close attention the absolute magnitude of an object.[1] But we note very carefully the relative magnitudes, *e.g.*, those of the two sides of a rectangular figure, of the longer and shorter dimensions of an oval form. This is seen in the fact that a very slight deviation from the true proportions in the drawing of a human figure or face at once strikes an observant eye.

The comparative inattention to the absolute magnitude of visible objects is explained by the superior importance of the form-element in ordinary cases of recognition; also by the circumstance that the absolute size of the visible object continually varies with its distance from the

[1] This is illustrated in the absence of any feeling of incongruity in looking at a colossal statue, or at a fine miniature drawing.

eye, while the relative size of its parts remains constant, and so is the main clue to the nature of the object. It may be added that this perception of relative magnitude or proportion does not, in common cases, include the detection of numerical relations. We do not see the length of one side of a rectangle standing in the ratio of 3 : 2, or of 2 : 1 to that of the other.[1] Even the number of sides entering into a figure is not recognised in the ordinary perception of that figure, but presupposes (as we shall see presently) a certain effort of abstraction.

Binocular Perception of Space. Under normal circumstances we see with two eyes. These must be regarded as a single organ. Numerous facts show that the perception of space has been developed by aid of the two eyes in co-operation.

The co-operation of the two eyes in vision differs from that of the two hands in touching. These last double the area perceived at any one moment. When, however, we look at an object with the two eyes a large part of the field of view is common to both. The eyes are both fixed on the same central point (point of fixation, German *Blickpunkt)*, and all the central portion of the field is seen by both eyes. The sweep of the field is only increased to some extent at the two sides, to the right by means of the right eye, and to the left by means of the left eye. The portions of the field common to both eyes as well as those peculiar to each are not seen as double but as single. That is to say we see one single field or one continuous scene.

This general statement is subject to some limitations. Objects in certain portions of the field having a particular situation relatively to the common point of fixation are seen double. Thus when we are

[1] The recognition of equality of magnitude, as in the square or the isosceles triangle, is, however, an ingredient in the ordinary perception of form.

looking at a distant object a second object, as a pencil, held just in front of the nose is seen as double. This doubleness of images is, however, to a large extent overlooked by us.

A good deal of speculation has been expended on the question: Why do we see objects as single when we receive double impressions from them? This is known as the problem of single vision. It has been supposed by some that there are certain 'corresponding points' on the two retinas, the impressions received by which uniformly coalesce in a single impression.[1] And it has been argued that this perfect coalescence of two visual impressions is only possible by means of a fusion of the nerve processes. Hence an attempt was made to show by means of anatomical facts that this conjunction of nervous processes did take place. More recent research has gone to modify this theory. Though impressions of the corresponding points do usually combine they are not the only ones which do so. Nor do even these coalesce in all cases. Exceptional circumstances may frustrate the coalescence. Many facts, such as those of the stereoscopic combination of pictures, and the perception of relief and solidity, and the non-fusion of totally dissimilar impressions (as when the two eyes look at two different colours) support the conclusion that the mind can distinguish the impressions received by way of the so-called corresponding points. The customary coalescence of the impressions of the two eyes, and the limits of this, are only to be explained by looking at visual perception as developed along, and in close co-ordination, with tactual perception.[2]

Visual Perception of Depth. So far we have traced the development of the child's perception of space in two dimensions, that is of the position of points on a surface, one above another, to the right of it, and so on. By a reference to ocular movement supplementing the original discrimination of the retina, we have been able to understand this mapping out of the field of vision. In looking out into space, however, we see the situation of points not only in relation to

[1] These corresponding points include the two centres of the retinas and all pairs of points situated symmetrically with respect to these, *i.e.*, in the same direction to the right of them, above them, and so on, and at the same distance from them.

[2] For a fuller account of the phenomena of single and double vision here touched on, see my article already quoted, *Mind*, Vol. III. (1878).

one another but in relation to our own position. One point lies away to the left of us, while another lies to our right. One part of the scene is further off from us than another. That is to say we see things in a space of three dimensions, having depth or distance as well as superficial magnitude.

The above supposition of a development of a purely ocular perception of a flat picture-world is of course a fiction. No one can say what sort of view of things we should have by means of these visual experiences alone, for nobody has undergone them. Things would probably appear as only flat projections on a sort of big screen, which would not have any distance assigned it. Perhaps we should regard these flat things as touching us (after the analogy of touch-experience), as those born blind and afterwards recovering sight are said to have at first regarded visible objects. It is to be added that this picture-world would be a different one for every variation in the distance of the objects. An object receding from us would appear to become a smaller one, but we should not know what this meant. And we should know nothing of 'real as distinguished from apparent magnitude.[1]

When tracing the growth of the tactual perception of space we saw that a child could obtain a direct apprehension of the situation of an object with reference to himself by arm-movement (stretching out to reach the object), supplemented or not by leg-movement (walking towards it). But the movements of the eyes are incapable of giving us this direct apprehension of depth. We cannot carry the eyes out into space, but only roll them about in their sockets. We do indeed move them differently when we merely pass from one point to another on a surface and when we

[1] It must be remembered that in such a condition of things as that here supposed movements of the eyes from points nearer or further off would probably somehow be distinguished from movements over points equidistant from the organ. But we cannot conceive what the nature of this difference would be.

pass from a further to a nearer point. In the latter case the two eyes are made to converge.[1] But this difference would not of itself make known the fact that one object was nearer than another. There is every reason to suppose that in recognising the situation of objects with respect to himself the child is deriving aid from his experiences of active touch. In other words the visual perception of depth is developed in conjunction with, and by the aid of tactual perception.

Perception of Direction. By means of ocular movement supplementing retinal discrimination a child perceives the *relative* direction of points lying in the field But he does not recognise the *absolute* direction of an object, that is to say its situation with reference to his own position, as to the right of him, or above the level of his head; this mode of perception has reference to arm-movement away from the body. It is by reaching out the hand that the child discovers the absolute direction of an object in the field.[2]

This absolute direction is suggested to the child by means of certain visual signs. The chief of these is the position of the eyes at the moment, as made known by the sensations of contraction which are connected with the condition of the ocular muscles.[3] In 'fixating'

[1] The exact difference between these binocular movements over the common field and the movements of the single eye is well brought out by Wundt, *Physiologische Psychologie*, II., Cap. 13, § 5.

[2] If the object is further off leg-movement is involved as well. But arm-movement is the more important element. Even in the case of distant objects direction is commonly apprehended by the movement of the arm in pointing, a movement which causes the hand to cover the object.

[3] As we have seen, the condition of the adjacent parts probably contributes elements to the sensation of contraction.

or looking at a point to the right of us the state of contraction of the muscles concerned and the accompanying sensations are different from those which arise when a point to the left is looked at. For every change in the direction of vision there is an accompanying change in the muscular sensations. Along with these sensations of the ocular muscles must be taken those of the muscles of the neck concerned in moving the head to the right and to the left, upwards and downwards.[1]

The conjoining, associating, or co-ordinating of these ocular sensations or signs with the arm-movements signified is the work of experience. At first the child is unable to grasp an object which he sees: his hand passes by it. Gradually by innumerable repetitions of arm-movement in connection with the visual sensations, the latter become firmly united with the former. When the child now looks at an object, there is instantly suggested the kind of arm-movement necessary for reaching the object.

The reason why in later life we are not distinctly conscious of these muscular sensations is that they have become inseparably fused with the representative elements which accompany them. They have no interest and importance in themselves but only as signs; and according to the law of attention that we pass from what is relatively unimportant or uninteresting to what is important or interesting, we have acquired an invariable habit of passing from them instantly to the representations which they call up.[2]

[1] The absolute direction of a point seen indirectly or in the side portion of the field is known by means of our knowledge of the direction of the centre of the field, that is the point fixated, together with our apprehension (by means of the local signs of the retinal sensations) of the relative positions of these two points.

[2] The connection of the evanescence of these ocular sensations with the laws of attention has been emphasised by Helmholtz: See *Sensation and Intuition*, Chap. III., p. 63.

According to the older theory we have an intuitive knowledge of direction. We tend, it was said, instinctively to project retinal sensations in the direction of the rays of light entering the eye-ball. In this way the alleged difficulty of seeing objects erect and not inverted, as they are represented in the retinal image or picture, was supposed to be overcome. But the difficulty and the solution are alike imaginary. They imply the erroneous supposition that in seeing things the mind has a direct knowledge of the structure of the eye, the arrangement of the parts of the retina and the mechanism of the organ as an optical instrument. The difficulty alleged to inhere in the fact of seeing objects erect disappears as soon as we recognise the truth that direction has a reference to arm-movement.

Perception of Distance. It is this aspect of visual perception which has attracted most notice among English psychologists. Berkeley's aim in his Theory of Vision was to show that in seeing the distance of an object we are interpreting visual signs, as destitute of meaning in themselves as word-sounds, and like these acquiring all their meaning by association, or by the teaching of experience. This experience, in the case of visual signs, is what we have called Active Touch (movement and contact).

Since the eye cannot perform an excursive movement out into space, it never gives us any direct knowledge of distance. What is meant by the distance of an object, its remoteness from our own body, is ascertained by means of arm-movement, or in the case of greater distances, by this supplemented by leg-movement. When we look at an object, say a shop across the street, and 'intuit' its distance, we represent the amount of muscular activity needed to bring us up to or in contact with the object. The perception of distance has always a reference to movement towards the object, and more particularly the extent or range of this movement.

How then, it may be asked, are we able to recognise distance at all by means of sight? The answer is the same as in the case of recognising direction: By means of certain ocular sensations which by their distinguishable characters serve as a system of signs. In the case of monocular vision these signs are the sensations attending the accommodation of the eye, that is to say the varying of the degree of convexity of the eye-ball (or lense) for different distances.[1] In looking at a very near object the muscles concerned in this process are greatly contracted. The degree of contraction determines the character of the accompanying sensation of contraction. Hence this last serves as a sign of the distance.

This monocular perception of distance is, however, greatly inferior to the binocular.[2] By the use of the two eyes we have an additional system of distance-signs. Since in moving the two eyes the axes are always directed to the same point of the field, it follows that a movement to a nearer or to a further point involves a change in the relative position of the eyes. In the former case the two axes turn towards one another or become more convergent: in the latter they become less convergent. These changes in the degree of convergence are accompanied by different muscular sensations; and it is these sensations which serve as the signs of different distances.

[1] This process of accommodation carried out by the ciliary muscles is necessary to distinct vision, that is to say the formation of a distinct image on the retina. By altering the convexity of the crystalline lense it secures that the rays of light shall in every case be focussed on the retina.

[2] The limits of the monocular discrimination of distance by means of sensations of accommodation are given by Wundt, *Physiol. Psychologie*, II., Cap. 13, § 1, p. 71.

The discrimination of distances by means of the different sensations of convergence has been measured. It is found that the least change of distance perceptible is a pretty constant fraction of the whole distance, and that consequently the discrimination of distance obeys approximately Fechner's law. Further this discrimination is finest in the case of distances in the appreciation of which we are most practised.[1]

The sensations of convergence, though giving us a much wider range of distance-discrimination than those of accommodation, cease to avail when objects are very remote. In these cases the perception of distance is determined by other elements, and takes on more of the character of a conscious *judgment.* These signs include the alterations of the apparent magnitude of objects with varying distances, also what are known as the effects of aerial perspective, namely variations of the absolute degree of brightness, of the relations of light and shade and the degree of distinctness of the parts, and finally of colour, due to the action of the intervening medium.

The most important of these factors in this perception of greater distances is the 'apparent magnitude' of an object. This is determined by the size of the retinal image or picture, or the magnitude of the 'visual angle' subtended by this. As objects recede their retinal pictures decrease in area, whereas when they approach they increase. Whenever the object is a familiar one, as a tree, a house, a sheep, these variations of apparent magnitude are auxiliary signs of the distance of the object. Thus in looking across a Swiss valley we judge of the distance of the opposite

[1] For an account of these measurements see Wundt, *Physiol. Psychologie,* II., Cap. 13, § 3, p. 93.

mountain-side by the apparent magnitude of the chalets, the goats, and so on.

Perception of real Magnitude. The real magnitude of an object is directly known by means of active touch, arm-movement, or if the object is a large one, as a wall, by the aid of locomotion as well. All that the eye gives us directly is a variable apparent magnitude determined by the area of the retinal image. Since this varies inversely as the distance (increasing when this decreases, and *vice versa*), the recognition of the corresponding real magnitude takes place in close connection with that of distance. If the object is a familiar one we instantly recognise its real magnitude, whether or no we have a distinct perception of its distance. In this case the apparent magnitude may become one factor in our estimation of distance as shown above. On the other hand in the case of unfamiliar or unknown objects we only recognise (real) magnitude by aid of a perception of its distance. Thus we only recognise the height of a cliff in a landscape by first judging, roughly at least, of its distance.

While the perception of real magnitude thus implies, ultimately, a reference to active touch, it probably contains also a proximate reference to a visual standard. In looking at an object, as a house, at a considerable distance, we seem first of all to recall the visual magnitude which it presents when near. We appear to transfer it imaginatively to a nearer point, namely at that distance from us which is most favourable to the seeing of it at once distinctly (in its parts) and comprehensively (as a whole).

The perception of magnitude is further affected by a knowledge of the position of the object relatively to the spectator. Thus in estimating the height of a church-spire, we allow for the difference of level between the object and the eye, and the consequent (apparent) diminution of the vertical dimension. So again in estimating the length of an object foreshortened, as an arm stretched out towards us, we allow for the inequality of the distance of the several parts from the eye.

Perception of Relative Distances. In the above account of the perception of distance we have been concerned only with the absolute distance of an object, not with its distance relatively to that of another object. We may recognise a difference of distance between two objects by moving the eyes from one to the other and discriminating the sensations of convergence in the two cases, or the degrees of distinctness of the objects.

This, however, is not necessary. In 'fixating' or looking at any object we at the same moment see less distinctly other objects further off, and nearer. This indirect perception of distance involves retinal discrimination. In looking at any point P a nearer point P′ images itself on the outer regions of the two retinas, whereas a more remote point P″ images itself on the inner regions. Since every change in the position of the stimulus on the retina is attended by a change in the resulting sensations, this difference in the relative position of the two retinal images makes a difference in the whole mental impression. And it is this difference which serves as the ocular sign of nearer and further.

This mode of discriminating distances by the differences of local character of the two retinal impressions has been measured by Helmholtz. He found that so small a local disparity of the retinal images as ·0044 millimetres affected the judgment. Wundt seeks to show that these limits point to the influence of muscular sensations. (See the article in *Mind* already referred to, Vol. III., 1878, pp. 16, 17.)

In looking at objects further off other circumstances help to determine our judgment of relative distances. These include the facts of linear perspective. For example we come to recognise that one object, say a mountain, is nearer than another, when the contour of the second is broken and partially covered by the first.

Perception of Solid Objects, or Objects in Relief. The visual perception of a solid body or a body having relief is simply a special case of recognising distance. A solid or cubical body is one the parts of which lie at unequal distances from us, some advancing, others receding. There is no original intuitive knowledge of solidity by means of the eye. This knowledge is gained by means of active touch in the way indicated above (by passing the hand or hands over an object's surface, grasping or embracing it).

The recognition of this solidity in the case of near objects takes place by discriminating the impressions received by way of the two eyes. A flat picture projects one and the same image on corresponding parts of the two retinas. On the other hand a solid body, if not too far off, projects two partly dissimilar pictures. Thus in looking at a box a little in front of the face the left eye sees further round the left, the right eye further round the right of it.[1] This dissimilarity of the pictures makes a difference in the mental impression.

This dissimilarity of the two retinal pictures and corresponding mental impressions is not the only sign of solidity. Even in the case of those portions of the object which are seen by both eyes, there is a peculiar arrangement of the images on the two retinas due to the unequal distances of the parts of the object. Thus in looking at any point on the nearer edge of a cube the corresponding point on the

[1] This can be ascertained by alternately closing each of the eyes and comparing the impressions received by means of the open eyes.

further edge images itself on two non-corresponding points of the retinas lying inside the centres. Hence this point is projected further away, and the object viewed as receding.

Our knowledge of these signs of relief and solidity has been greatly furthered by Sir Ch. Wheatstone's discovery of the Stereoscope. This instrument imitates the effect of solid objects by presenting to the two eyes two distinct projections of an object, as a building, taken from two slightly different points of view.

The perception of solidity or relief may also be gained by means of the sensations of convergence which attend movements of the eyes from point to point of the object. But the fact that the stereoscopic recognition of solidity arises instantaneously when the two pictures are illumined by an electric flash shows that such movements are not necessary.[1]

When an object is further off, relief or solidity is recognised by other signs. These include the distribution of light and shade on the surface, or what is known by artists as 'modelling'. Thus the prominence of a distant mountain is perceived by the gradations of light and shade. Of still greater importance than this is what is known as the cast-shadow. Objects in a landscape stand out much better in morning and evening light when strong and distinct cast-shadows are thrown, than in noonday light. The painter has, it is obvious, to produce all impressions of relief by means of such auxiliary signs.[2]

Here, again, it is well to note that in perceiving the figure of a solid body there is commonly a proximate reference to other *visual* perceptions. A complete visual intuition of solidity is obtained by turning an object about, and successively looking at different sides or aspects.[3] Hence when we have any aspect of an object presented to us we tend to

[1] For a fuller account of the elements entering into the perception of solidity, see my article in *Mind*, Vol. III. (1878), p. 21 *et seq.*

[2] For a fuller account of the elements entering into our judgment of relief, and of the errors to which this is liable, see my work on *Illusions*, p. 77, &c.

[3] If the body is a larger one, the same end is served by walking round it and viewing it from different standpoints.

supplement this by a mental representation of the other aspects. This tendency shows itself most powerfully when the less favourable, less instructive, or less interesting aspect of an object happens to present itself to the eye. Thus when a book is placed directly opposite the eye with the surface of the cover at right angles to the line of vision we tend to supplement this imperfect view by filling in imaginatively the appearance of the edge as seen, say from a point to the right and above the book. Similarly on seeing a face in profile we tend to represent the full face.

Visual Intuition of Number. Closely connected with the development of the perception of things in space having figure and magnitude is the growth of the visual intuition of a multitude or multiplicity of things. A plurality of objects is recognised in the case of the eye, as in that of the hand, by the local separateness or discreteness of the impressions. This holds good whether we pass the eye over them or embrace them by a single glance. In vision we are able to take in in one view a considerable number of objects, seeing them together as a collection or assemblage of things.

At the same time, this extended grasp of a number of things by the eye appears to involve a reference to active touch. This has been illustrated by the phenomena of binocular combination and single vision. The impressions of the two eyes are combined in circumstances which are found by experience to correspond to the tactual perception of a single object.[1] So, again, when one object partly covers another further off, so that their contours become continuous

[1] This is illustrated by the apparent exceptions, as the phenomena of double images. When I have two images of an object (*e.g.*, of one much nearer than the object fixated) I instantly recognise this doubleness as belonging to the visual impression and not to the object.

we discern plurality by recognising the difference of distance.

We commonly see an object along with others, standing out from a dimly discriminated mass of objects. But we do not in general view objects together as a collection except when they are near one another so as to be easily seen together, and when they are like one another or objects of the same class, as in looking at a heap of pebbles, or a row of trees.

Our visual perception of a plurality of things must be distinguished from our recognition of them as a particular number, say three, or six. A child perceives all differences of number at first as mere differences of magnitude, of greater and less. That is to say, discrete quantity is not yet differenced from continuous. The knowledge of number as such is gained by means of a series of perceptions and an exercise of the powers of comparison and abstraction. It presupposes a process of counting by breaking up a group of objects into its constituent parts or units (analysis), and of re-forming it out of these (synthesis). Along with such experiences, it involves the variation of a group of things in respect of its figure or mode of arrangement, so as to distinguish number from form, and the comparison of groups of things similar only in their number. After such experiences a child learns to look on a group of things as a number, and on a single object (in its relation to an actual or possible collection) as a unit. And in the case of very small numbers, as 3 and 4, he can by a momentary glance intuit the number.[1] And even in the case of larger numbers, as 12, the rapidity with which the eye can run over them and seize their numerical aspect is a fact of great consequence. It gives to sight a special function in the acquisition of the knowledge of number. As we shall see by and by, our ideas of number are closely connected with visual pictures of concrete numbers, or numbered groups of things, such as dots, &c.

Perception of Objective Movement. As we have seen, ocular movement is the original experience

[1] Sir W. Hamilton, following other authorities, says that we can in one and the same instant distinctly attend to six objects; and this would seem to give the limit of the clear recognition of number at one moment (*Lectures on Metaphysics*, Vol. I., Lect. XIV., p. 254). Wundt conducted a series of experiments in order to ascertain how the reaction-time varied with the increase of the number of visible objects looked at. He took printed ciphers and found that with a momentary illumination the eye could distinctly take in a series of six numbers (*Physiol. Psychologie*, Vol. II., Cap. 16, 4).

which suggests to the eye the coexistence of points in space. From this consciousness or perception of 'subjective' movement, that is to say the movement of our own organism (eye or head), must be distinguished the perception of 'objective' movement, or the movement of objects.

The perception of movement arises in one of two ways. First of all we may follow a moving object with the eye and perceive its movement in direct vision. In this case the objective movement is recognised by means of the muscular and other sensations accompanying the movement, coupled with a persistent impression received by way of the area of perfect vision. In the second place we may perceive the movement of an object across the field in indirect vision, the eye being at rest. In this case we recognise the movement of the object by means of a succession of locally differenced retinal sensations coupled with the absence of muscular sensations.

In its developed form the perception of movement implies the intuition of space. It includes the recognition of a transition from one point of space to another, or of a continual change of position. It thus stands in a particularly close relation to the perception of direction. Hence we may infer that like this it has been developed in close connection with Active Touch. And this inference is borne out by observation. Thus when with one eye closed we press the outer region of the other eye-ball there is an apparent movement of objects. But we instantly distinguish this from a movement of the objects themselves.[1]

Our perception of the movements of things by the eye constitutes the principal mode of recognising change in the external world. The most important events of this world are reducible to (perceptible) movements, either those of a whole object, or group of objects, or those of parts of objects. This remark applies to the numerous changes of position of objects (inanimate and animate) due to the action of other bodies, and to the internally caused actions of living things; also to the changes in the size and figure of bodies due to compression, expansion, &c.

Résumé. It follows from this short account of the nature of visual perception that, though an instantaneous automatic operation in mature life, it is the result of a slow process of acquisition involving innumerable experiences in early life. It is probable that in connection with the inherited nervous organism every child has an innate disposition to co-ordinate retinal sensations with those of ocular movement, and visual sensations as a whole with experiences of active touch.[2] But individual experience is necessary for the development of these instinctive tendencies.

A moment's thought will show that the experiences of early life must tend to bring about the closest possible associations between sight and touch, and to favour that automatic interpretation of "visual language" which we find in later life. The child passes a great part of his waking life in handling objects, in

[1] The whole group of phenomena known as apparent movements *(Scheinbewegungen)* are important as illustrating the close connection between visual perception and experience of Active Touch. For a fuller account of these see my volume, *Illusions*, pp. 50, 57, 73.

[2] This conclusion is reached deductively from the general laws of evolution. It may also be verified, to some extent, by the observation of the rapid progress of space-perception in early life.

walking to and from them, and at the same time looking at them and noting the changes of visual impression which accompany these movements. Thus in countless instances he notices the increase of the 'apparent magnitude' of a body when he moves towards it: the dissimilarity of the two visual impressions received from a solid body while he is handling it, and so on. In this way an inseparable coalescence of signs and significates takes place at a period of life too far back for any of us to recall it.

When this stage of automatic visual perception is reached reference to touch in all cases is no longer necessary. Sight has completely absorbed the touch-elements, and is now independent. In the large majority of cases we recognise distance, real magnitude, and solidity, without any appeal to movement and touch. Seeing has now become the habitual mode of perception. It is only in doubtful cases that we still go back to touch to test our visual perceptions.

While, however, vision is thus in a manner based on tactual perception, it far surpasses this last in respect of discriminative fineness as well as in comprehensive range. Seeing is more than a translation of touch-knowledge into a new language, and more than a short-hand abbreviation of it. It adds much to this knowledge by reason of its more perfect separation and combination of its sense-elements.[1]

[1] A rough analogy is suggested by the phrase 'visual symbols'. Just as the use of symbols in mathematics and logic (owing to their very nature) helps us to reach ideal results which only remotely represent actual facts, so the addition of the visual symbols to tactual perception allows of a kind of idealising of our experience of active touch.

In the above sketch of the modern theory of the visual perception of space no reference has been made to the rival theory, that the eye has from the first and independently of Touch an intuitive knowledge of space in three dimensions.[1] The hypothesis that the young child brings with him into the world an inherited tendency to group in the way described the several elements (visual and tactual) entering into visual perception of space, would supply a means of reconciling the opposed theories of an original and a derived space-intuition by the eye.

Intuition of Things. In looking at an object, as in touching it, we apprehend simultaneously (or approximately so) a group of qualities. These include its degree of brightness as a whole, the distribution of light and shade of its parts, its colour (or distribution of colours), the form and magnitude of its surface, and its solid shape. These seemingly immediate intuitions involve as we have found tactual as well as visual elements.[2] This may be called the fundamental part of our intuition of a particular object. In looking at a new object, as a gem in a cabinet, we instantly intuit or take in this group of qualities, and they constitute a considerable amount of knowledge concerning the nature of the object as a whole. In proportion to the distinctness with which these qualities are discriminated both severally (*e.g.*, the colour blue from violet, the oval form from the circular) and collectively (*e.g.*, the aggregate of properties of one mineral or plant from that of another) will be

[1] One of the most recent statements of the Intuitive theory is contained in Mr. Abbot's *Sight and Touch*. The most important forms of this theory as put forward in Germany are dealt with in an article of mine in *Mind*, Vol. III., 1878, p. 167, &c. See also Appendix D.

[2] It may be remarked that the distribution of light and shade on the surface of an object as an orange, suggests not only the curvature of the surface, but its roughness or pittedness.

the clearness and accuracy of our perception of the thing as a whole.

The recognition of any individual object, as a particular toy or cat, or of one of a class of things, as an orange, presupposes a *repetition* of this assemblage of qualities. In this case the group is not only discriminated but identified. Thus on seeing an orange a child at once 'classes' the aggregate of qualities (yellow colour, roundness of form, &c.), with like groups previously seen.

Not only so, in thus classing a particular group of qualities (visual and tactual), a child takes up along with these other conjoined qualities. Thus in recognising an object as an orange he invests it more or less distinctly with a particular weight, temperature, taste, and smell. In this way visual perception (embodying important tactual elements) suffices for the full apprehension of an object clothed with its complete outfit of qualities.

Unequal Representation of Qualities in Perception. It is not meant that the whole aggregate of qualities will be called up with equal distinctness. In looking at an orange, for example, we appear to represent its taste better than its smell and its touch (degree of roughness, hardness) better than either. The reason of this inequality will appear more fully in the next chapter. Here it is enough to say that the sensations of the more refined or more discriminative senses are (in general) more 'revivable' (*i.e.*, capable of being more distinctly reproduced) than those of the less refined senses; also that the facility of revival varies with the frequency of the past experience. We represent the roughness of the orange's surface better than its taste partly because tactual sensations as a whole are more revivable than gustatory, and partly because the experiences of touching the rough surface of oranges and other objects (in connection with seeing them) vastly outnumber the experiences of tasting the fruit.

Combining Qualities in a Single Object. The intuition of a thing implies the apprehension of a cluster of qualities existing side by side, or coexisting in one and the same object. This fact of coexistence is known by repeated transitions from one kind of sense-experience to another. Thus we may proceed from looking at an object to touching, hearing or smelling it, and *vice versa*. This variation of successive experiences is supplemented by an approximately simultaneous experience of touching and seeing it at the same time. Thus the perception of a thing as the sum of coexisting qualities arises much in the same way as the perception of a surface as made up of coexisting points.

A child's reference of a multiplicity of sense-experiences to one and the same object involves more than this relation of simultaneity or interchangeableness between them. It becomes distinct by the aid of a number of acquisitions. To begin with, it presupposes a recognition of the identity of the tactual and visual space-scheme. The same object to his sight and touch is that which occupies the same position (or corresponding positions) in his two maps (visual and tactual). Thus in looking at an object which he is holding in his hands he has a double perception of its position, by touch and by sight; and these tend in time (as we have seen) to be regarded as equivalent. In addition to this, there are the correspondences in the tactual and the visual apprehension of form, as in moving the fingers and the eyes about the contour of an oblong object such as a book. Once more, his reference of other sense-experiences, as those of hearing and smell, to the same object as is seen and touched depends on a knowledge of the situation of the organs concerned, and also of the changes which accompany the experience as the object is brought near, or removed from, the organ. Thus he knows that it is the watch he holds in his hand which emits the ticking sound, because when he moves it to his ear (which movement is known partly by active touch and partly by vision) the impression of sound becomes more powerful and more distinct. Finally this conjoint reference of different sense-experiences to one object is aided by his gradual acquisition of a knowledge of other equivalences. Of these the most important is that between movement and sound. At a very early age he learns to connect a sound, as that of a bell, with the corresponding movement that of the clapper, which he sees at the moment.

Reference of Quality to Substance. In adult life we refer any quality of an object, as the colour or taste of an orange, to a substance in which it is said to inhere. And this idea of substance makes up an important part of our meaning of 'thing'. Now it is clear that we can never know directly anything more of an object than the sum of its qualities as presented to our senses. We have then to ask how the idea of a substance as distinct from qualities comes to be suggested to the growing mind. It would appear that this takes place by help of a difference among these qualities already touched on, namely between the primary and secondary qualities. The characteristics of the former already briefly enumerated would lead the child gradually to regard these as the base or essential portion of the thing, and to view the secondary qualities as supported by this foundation.[1]

Identifying Objects. The recognition of a thing as identical with something previously perceived is a complex psychical process. It involves not only the identification of the group of impressions but also the germ of a higher intellectual process, namely the comparison of successive impressions and the detection of similarity amid diversity or change. Thus a child learns to identify a particular object, as his hat, or his dog, at different distances and under different lights (in bright sunlight, evening dusk, &c.). Of these changes of aspect one of the most important is that due to the position of the object in relation to the spectator. The difference of impression in looking at a hat 'end on,' or foreshortened, and from the side, or in having a front or side view of a face, is considerable. Children require a certain amount of experience and practice before they recognise identity amid such varying aspects. Finally there are the changes which take place in the objects themselves, such as alterations of form due to accident, or to movements of certain parts, and of magnitude due to growth. It is not surprising, then, that the clear recognition of the identity of individual objects belongs to a comparatively late period of child life.[2]

Finally it is to be observed that the identification

[1] This dependence of the secondary qualities, colour, taste, &c., on the primary (geometrical and mechanical) is well illustrated by J. S. Mill, *Examination of Sir W. Hamilton's Philosophy*, Chap. XIII., p. 262, *et seq.*; *cf.* Taine, *On Intelligence*, Part II., Book II., Chap. I., Section IV.

[2] The recognition of a particular substance, as wood, iron, or glass, illustrates the mere process. The similarities of colour, texture, and lustre, are

of objects is greatly aided by the social environment and by language. A child learns to perceive and recognise objects in association with others. From the first the mother or nurse is pointing out objects to him; describing their characteristics, and naming them. By these interchanges of impressions and this social guidance he learns that others see things as he sees them, that external things are *common* objects of perception. And by hearing them again and again called by the same name he learns more quickly to regard them as the same.

The recognition of an object as the same as that previously seen implies the belief in the permanence of the object when not seen. This only becomes distinct when the child by repeated experiences discovers a fixed order among his perceptions, and the dependence of his perceptions on his voluntary movements. Thus he finds out that he can see and touch a particular object, say his rocking horse, every time he chooses to enter his nursery. The fact that others see objects when he no longer sees them, and talk to him of their impressions greatly helps the growth of this idea of things as permanent.[1]

Perception of our own Body. In close connection with the perception of external objects the child comes to know the several parts of his own body. As has been said, sensations when not referred to external bodies are in adult life localised in some part of the organism. Thus all organic sensations, as skin-sensations of "creeping," burning, or tickling, are definitely localised in some region of the arm, foot,

detected amid differences of form. The assimilation of very unlike things, as oranges, grapes, &c., under the head of a wide class of objects, fruits, involves a higher exercise of the assimilative function to be illustrated by and by.

[1] The dependence of our knowledge of things as permanent on the renewableness of sensations is illustrated by J. S. Mill in the work just referred to (Chap. XI., p. 221, *et seq.*).

and so on. Even in the perception of external objects there is a more or less distinct reference to the sense-organ concerned. In the act of hearing a sound, and even of seeing an object, we are vaguely aware of receiving the sensation by way of the ear or eye. In touching objects this reference to the organ becomes much more distinct. In grasping a thing, as a spoon, a child is directly aware (by the local characters of his touch sensations and by muscular sensations) of the locality or position on the surface of the hand of the several impressions received. The recognition of the form and magnitude of the spoon is indeed based on this localising of his sensations of touch in certain definitely represented portions of the hand.

This knowledge of the 'seat of sensation' and of the form of the bodily organism is, just like the knowledge of external things, acquired by experience. The distinctness of the several nerve-fibres, and the definite 'local character' marking off the sensations corresponding to each of these must be assumed. The child could never learn to localise a sensation in his toe, if the sensations received by way of the particular nerves concerned had no distinctness of character at the outset. But the referring of a bodily sensation to a definite region of the body implies more than this, namely, experiences of active Touch and Sight *as employed about the body itself.* A child's body is an object which he can touch and see, like an external thing. The whole of the surface can be explored by the hands, and a good part of it by the eyes as well.

Let us suppose that the child has a sensation of irritation at a point P on his right foot. This sensation has the 'local colouring' π. By a certain sweep of his arm he is able to carry his hand to this point and so to modify the sensation. Again and again he performs this kind of movement and either modifies a pre-existing sensation having the character π or produces a new one (by the contact of his hand with P). By repeated movements of this kind all sensations having the character π become associated with this particular sweep of the arm. Similarly in the case of other sensations having other local colourings π', π'', and so on. By moving his hand over his body, as in stroking himself, he gains a clearer apprehension of the relative position of the parts, and of the form of the bodily surface. In this way he gradually gains a tactual map of his bodily organism which he henceforth carries about with him. This tactual map is supplemented by a visual map gained by looking at the various parts of the body either directly or by the aid of mirrors, &c. When this stage is reached all sensations are instantly referred to their proper locality on the bodily surface.

For the sake of convenience it is here assumed that we learn to localise sensations of contact on the bodily surface without any aid from the movements of the part touched, just as we assumed before that we learn to refer touch-sensations to different *external* points solely by aid of these movements. But in truth the capability of localising sensations at the surface, and of externalising them are only two sides of one capability, and are developed *pari passu*. This is illustrated in the truth emphasised by Vierordt, that the more mobile the part of the surface, the better our topographical representation of it. We localise sensations of touch on the hand, or at the tip of the tongue, much more distinctly than on a portion of the immobile trunk.[1]

[1] Experiments have been conducted by Professor G. Buccola with a view to ascertain the rapidity of the localising process. The most important result reached is the following:—"It is not always the excitation of the regions of

The truth expounded above that our ability to localise a sensation on the surface of the body depends on the tactual and visual exploring of this surface is shown in a striking manner in the illusions of those who have had a limb amputated. When the truncated nerve is excited and a corresponding sensation occurs, the patient instantly refers it to the extremity of the limb as before. Thus the man who has lost a leg still localises certain sensations in his toe. This tendency to project sensations to the periphery, whatever the region of the nerve acted upon by the stimulus, is known as the Law of Eccentricity. And this is fully explained by the fact that under normal circumstances we only have sensations when the peripheral extremity of the nerve is stimulated; that is to say when some portion of the bodily surface accessible to touch (or to touch and sight) is acted upon. This dependence is further illustrated by the indistinctness of the localisation of internal "organic sensations," as those of indigestion, which are connected with parts of the body not accessible to touch and sight.[1]

Bodily Organism and Self. To a child his bodily organism is marked off from all other objects by the fact that it is connected in a peculiar way with his conscious life, and more particularly his feelings of pleasure and pain. The experience of touching his foot with his hand differs from that of touching a foreign body inasmuch as there is not only a sensation in the hand, but an additional one in the foot. The contact of a soft or agreeable, or of a hard and painful substance with the skin is an (immediate) antecedent of a pleasurable or painful sensation. His pleasures and pains are largely bodily feelings. And these, whether due to external influences (as a blow

the surface furthest removed from the psychical centre which brings about the slowest reactions (or the longest reaction-time); but the duration of the process is constant provided the cutaneous zone excited is capable of a prompt exercise of tactual capability." In other words, "there exists a close relation between the localising capability and the time of the reaction" (*La Legge del Tempo nei Fenomeni del Pensiero*, Chap. VIII., p. 245).

[1] For a fuller account of these false localisations see my work, *Illusions*, p. 59, *et seq.* An interesting summary of the process of localising sensations is given by M. Taine in his volume *On Intelligence*, Part II., Book II., Chap. II., Section I. and following.

or caress), or to internal changes (*e.g.*, in the circulation or temperature), are always found to be connected with some part of the organism. Hence his body is regarded as a part of himself, and in early life probably makes up the chief part of the meaning of the word 'self'. It is contrasted with all other and foreign objects on the one hand, and, on the other hand, with all other like human organisms.

The child has little power of abstraction and cannot therefore turn his attention inward or *reflect* on his own thoughts and feelings. What is known by the term 'internal perception,' or 'reflection,' that is to say the observation of the mind's own states, is a comparatively late attainment. The young have of course some little knowledge of their feelings, but this is of a very vague character. The reason of this is that they cannot attend to their mental states in themselves and apart from the objects which excite them and the bodily organism with which they are connected. And the same is true of their knowledge of the feelings of others. Thus the antithesis of self and not-self, the internal mind and external things is imperfectly developed in the first years of life. The recognition of things as *external*, so far as a child attains to this knowledge at all, seems to imply outness in relation to the bodily organism.[1] A knowledge of externality in the sense of detachment from and independence of percipient mind is only attained

[1] In the case of all of us this reference to the bodily organism is always present. The very word 'externality' implying relation *in space* points to this. The most abstract of philosophers never succeeds altogether in projecting his own body into the external world and regarding it as a part of the not-self.

much later, in connection with that of the permanence of objects; though, as we have seen, the child at an early period begins dimly to descry this relation.[1]

Auditory Perception: Space Perception. As has been said, the recognition of space relations by means of the ear is very imperfect. Hence this organ is not an organ of perception as the hand and the eye are. This deficiency is connected with the fact that the ear is wanting in local discrimination and in mobility. What knowledge of space is directly accessible to hearing is due to the circumstance that the difference of impressions in the case of the two ears serves as a germ of local discrimination, and that movements of the head make up to some extent for the immobility of the ear. The perception of space by the ear is binaural just as that by the eye is binocular. The sense of *direction* in hearing seems to arise by noting the difference in the two impressions. If a sound is on one side of us this may suffice. Thus we instantly recognise the proximity of a buzzing insect to one ear. If the sound comes from a point in front or behind, movements of the head are necessary in order to bring about a difference of auditory impression. When sounds are far off this discrimination of direction becomes very de-

[1] This truth is rightly apprehended by Mr. Tennyson in the lines :—

> "The baby new to earth and sky,
> What time his tender palm is prest
> Against the circle of the breast,
> Has never thought that 'this is I';
>
> But as he grows he gathers much,
> And learns the use of 'I,' and 'me,'
> And finds 'I am not what I see,'
> And other than the things I touch."
>
> —*(In Memoriam. XLIV.)*

fective.[1] The perception of *distance* by the ear is only distinct and certain when we know the sound and can compare the intensity of the sensation with that experienced when the body is near us.

Time-Perception. While hearing thus gives us very little knowledge of space, it affords us exact perceptions of time-relations. By this is meant the grasping of a succession of impressions together, as a series, noting the order of their occurrence, and their individual and collective duration. This *perception* of successive or time-ordered impressions is something more than a succession of impressions or perceptions. It involves a subsequent act of reflection, by means of which the mind is able at the same time to comprehend them as a whole.

Sight affords us a knowledge of time-relations as when we watch a series of pendulum oscillations, or the more varied series of movements of a dance. But the ear is the principal organ of time-perception. Indeed it may be said that the ear perceives time-forms just as the eye perceives space-forms. This is connected with the fact already noted, that the ear is finely discriminative of the duration of its impressions, and can distinguish them when occurring in rapid succession. Thus we are able to apprehend with great clearness the length of a vowel-sound, also the succession of sounds constituting a word, and a series of words. It is this capability of finely distinguishing each member in a series of sounds, and of grasping

[1] It is possible that tactual sensations of the outer ear contribute to the sense of direction. For an account of the most recent investigations into this difficult subject, see Bernstein, *Five Senses of Man*, Section III., Chap. 2; Wundt, *Physiol. Psychologie*, II., Cap. 12, § 5.

them as a whole in their time-order that enables us so easily to understand speech, that is to say, to seize the relations of the underlying ideas.

This auditory appreciation of time-form becomes more complex in the perception of the rhythmic successions of verse and of music. Here the sense of duration becomes more important. What we mean by the appreciation of time in music includes the comparison of successive durations, both of single sounds and of series of sounds. Thus in 'common time' the ear recognises the equality of duration of the crotchets, &c., and of the successive groups of four crotchets making up the bars. The full appreciation of rhythm in music, and measure in verse, implies a recognition of numerical relations. The ear notes the periodic recurrence of a number of sounds in the case of each musical bar, and this recognition underlies the appreciation of time.[1] Further, the perception of the characteristic rhythm of a tune depends on the alternation of an accented sound with a certain number of unaccented ones. Similarly the appreciation of (modern) metre rests on the recognition of a periodic recurrence of a definite number of accents.[2]

Perception and Observation. All perception re-

[1] That is 'time' in the meaning of the German word Takt as distinguished from Tempo.

[2] We also appreciate rhythm, &c., by way of sensations of movement, as in dancing or watching another dance. But this appreciation is much less fine than the auditory appreciation. For a fuller analysis of the perception of time and rhythm by the ear, the reader is referred to my volume, *Sensation and Intuition*, Chap. VIII. The differences between the perception of space-form by the eye, and of time-form by the ear, are well illustrated by Mr. E. Gurney, *Power of Sound*, Chaps. IV. and V.

quires some degree of attention to what is present. But we are often able to discriminate and recognise an object by a momentary glance which suffices to take in a few prominent marks. Similarly we are able by a cursory glance to recognise a movement or action of an object. Such incomplete fugitive perception is ample for rough everyday purposes. On the other hand we sometimes need to throw a special degree of mental activity into perception so as to note completely and accurately what is present. This is particularly the case with new and unfamiliar objects. Such a careful direction of the mind to objects is known as Observation. To observe is to look at a thing closely, to take careful note of its several parts or details. It implies too a deliberate selection of an object or action for special consideration, a preparatory adjustment of the attention, and an orderly going to work with a view to see what exactly takes place in the world about us. Hence we may call observation regulated perception.[1]

Distinctness and Accuracy of Observation. Good observation consists in careful and minute attention to what is before us. Thus in order to observe nicely a particular flower or mineral we must note all the individual characteristics, the less conspicuous as well as the more prominent. Similarly if we wish to observe a process such as evaporation, or the movements of expression in a person's face, we must carefully seize all the steps of the operation. By such a

[1] Observation commonly means a prolonged or extended act of attention to things with a view to note the relations of objects to their surroundings, and of events to succeeding events.

close effort of attention we give distinctness to our observations, and accurately mark off what we are looking at from other and partially similar objects or processes with which they are liable to be confused.[1] It is to be added that accuracy of observation implies freedom from prepossession. We are apt to think we see what we strongly expect to see, and in this way we fall into illusory perception. To observe accurately is to put aside prepossession, to restrain the imagination, and to direct the mind with singleness of purpose to what is actually present to the senses.[2]

Development of Perceptual Power. Our analysis of perception has suggested the way in which our percepts are gradually built up and perfected. In the first weeks of life there is little if any recognition of outer things. Impressions are made on the child's mind, but at best they are only vaguely referred to an external world. It is by the daily renewed conjunctions of simple sense-experiences that the little learner comes to refer any impression when it occurs to an object in space. Of these conjunctions the most important are those between touch and sight. By continually looking at the objects handled, the visual perception of direction becomes perfected, as also that of distance within certain limits. The child learns to put out its hand in the exact direction of an object, and to move it

[1] We often distinguish between a 'clear' and a distinct perception. Thus we may see an object distinctly, in the sense that it is discriminated from its surroundings, without seeing it clearly, in the sense that it is well lit and so distinct *in its parts or details*.

[2] On the nature and sources of illusory perception see the author's work, *Illusions*, Chapters III.-VI.

just far enough.[1] The perception of the distance of more remote objects remains very imperfect before locomotion is attained. The change of visible scene as the child is carried about the room impresses him no doubt, but the meaning of these changes only becomes fully seized when he begins to walk about, and to find out the amounts of locomotive exertion answering to the different appearances of things. It is some years, however, before he begins to note the signs of distance in the case of remote objects.[2]

After many conjunctions of impressions the child begins to find out the nature of objects and the visible aspects which are their most important marks. That is to say he begins to discriminate objects one from another by means of sight alone, and to recognise them as they reappear to the eye. Sight now grows self-sufficient. What may be roughly marked off as the touching age gives place to the seeing age. Henceforth the growth of perception is mainly an improvement of visual capability.

At first this power of discerning the forms of objects with the eye is very limited.[3] The child notes one

[1] A child known to the present writer was first seen to stretch out his hand to an object when $2\frac{1}{2}$ months old. The hand misses the exact point at first, passing beside it, but practice gives precision to the movement. The same child at 6 months knew when an object was within reach. If a biscuit or other object was held out of his reach, he made no movement, but as soon as it was brought within his reach he instantly put out his hand to take it. On the other hand, Prof. Preyer says his boy tried to seize the lamp in the ceiling of a railway compartment when 58 weeks old *(Die Seele des Kindes*, p. 38).

[2] The same remark applies to the perception of solidity. A good many experiences of picture-books, &c., are necessary before a child distinguishes a flat surface from a solid body.

[3] The first objects to be so recognised are of course those of most interest to the child, that is to say most directly connected with his pleasurable (or

or two prominent and striking features of a thing but overlooks the others. Thus in looking at real animals, or at his toy or picture imitations, he will distinguish a quadruped from a bird, but not one quadruped from another. Similarly he will distinguish a very big dog from a small one, but not one dog from another of similar size.

The progress of perception grows with increase of visual discrimination, that is to say, of the capability of distinguishing one colour, one direction of a line, and so on, from another. It presupposes further the growth of attention. As experience advances the child finds it easier to note the characteristic aspects of things and to recognise them; and he takes more pleasure in detecting their differences and similarities. In this way his observations tend gradually to improve in distinctness and in accuracy. Not only so, an increased power of attention enables him to seize and embrace in a single view a number of details. In this way his first 'sketchy' percepts get filled out. Thus a particular flower, or animal, is seen more completely in all its details of colour, and its relations of form. At the same time he acquires the power of apprehending larger and more complex objects, such as whole buildings, ships, &c.

Waitz remarks that the apprehension of form by the child takes its start, not from the periphery or contour of the object, but from some striking detail (*e.g.*, the trunk of the elephant). Little by little he acquires the power of taking up into his view the other adjacent parts of the figure. Finally, by following the contour (in alternation with

painful) sensations. Prof. Preyer says that of inanimate objects bottles were among the first which his child carefully observed and recognised (*Die Seele des Kindes*, p. 42).

this simultaneous apprehension) he comes to grasp the whole form in its unity and its distinctness from its surroundings. (*Allgemeine Pædagogik*, 1er Theil, § 8, p. 108).[1]

The observing powers may develop in different directions according to special natural capabilities, or special circumstances. A particularly good colour-sense, accompanied by a lively interest in colours, will lead to a more careful observation of this aspect of things. Thus the painter will observe the delicate tints of objects of which others are hardly sensible. A naturalist has a keen eye for details of form which escape the common eye. Objects may thus be said to acquire a different content for different individuals according to the habitual direction of their observing powers. And this applies not only to the perception of the visible aspects, but to that of others as well. Thus to a man accustomed to handle and so test the quality of woollen stuffs, the sight of these objects will convey more than they do to another who is without these experiences. The visual impression which a piece of furniture makes on the mind of a carpenter is supplemented by a peculiarly rich accumulation of tactual and muscular associations.

Psychology and Philosophy of Perception. In the foregoing account of the development of perception, we have been concerned only with its *subjective* side, that is to say the nature of the psychical process by which percepts are formed. We have been answering the question: By what steps, by aid of what discoverable psychical facts, does a child reach what we call a knowledge of things in space and time?

[1] Progress in power of perception and observation may be roughly measured by the rapidity with which the forms of familiar objects are recognised, as in looking at drawings of animals, &c., at some distance: also the rapidity with which complex groups or numbers are distinctly apprehended; and the rapidity with which similar forms are distinguished.

After this problem has been answered there remains another question, or group of questions dealing with the *objective* side of perception, that is to say, with its validity as cognition when we have it. Looking at perception on this side we ask: What is the value of perception as an (apparently) immediate knowledge of something external to, and independent of, the knowing mind? What is meant by a thing, or external object, by space and by time? Do these terms stand for anything more than the product of complex groupings of sense-experience? Thus, is a stone nothing more than a sum of sensations of touch, &c., actually experienced at the time, or represented as uniformly occurring under certain circumstances, or does our knowledge of it as a material object in space imply more than the sum of all the sensations by the aid of which we come to know it? If the latter (as perhaps most persons would say), how is such knowledge guaranteed or made certain? Are we to suppose things existing out of all relation to mind, and somehow coming from time to time into relation with it? Or are we to conceive that the reality which things have is constituted by the constructive activity of intelligence itself? These problems belong to the Philosophy, as distinguished from the Psychology, of Perception. They are variously known as the problem of Presentative Knowledge or of External Perception, of the External World, of Realism and Idealism.[1]

The Training of the Senses. If the senses give us the materials of knowledge the proper use of them constitutes an important element in the economy of mind. To exercise the senses in the best way so as to accumulate the richest store of clear impressions, is the first step in the attainment of wide and accurate knowledge about the world in which we live. An eye uncultivated in a nice detection of form, means a limitation of all after-knowledge. Imagination will be hazy, thought loose and inaccurate, where the preliminary stage of perception has been hurried over. The best modern theories of Education have grasped this truth, and tried to

[1] The distinction between the psychology and philosophy of perception is more fully illustrated in my work on *Illusions*, pp. 36, 353. The student who cares to go into the philosophic side of perception may consult Prof. Fraser, *Selections from Berkeley;* Sir W. Hamilton, *Lectures on Metaphysics*, Vol. II., XXI., and following; J. S. Mill, *Examination of Sir W. Hamilton's Philosophy*, Chap. X., and following; H. Spencer, *Principles of Psychology*, Vol. II., Pt. VII., Chap. III., and following; Prof. Bain, *The Senses and the Intellect*, 'Of External Perception,' p. 364, &c. A summary of the different Theories is given by the last writer in his *Compendium of Mental Science.*

impress it on teachers' minds. Yet practice is, alas, far behind theory, and teachers make haste to build up the fabric of ideas in the young mind without troubling about a solid firm foundation of sense-knowledge.

The exercise of the senses implies the voluntary direction of attention on the part of the child to what is present. Sense-knowledge is gained by the young mind coming into contact with things immediately, and not mediately by the intervention of another mind. Hence the function of the teacher in this first stage of the growth of knowledge is a limited one. A good part of the exercise of the senses in early life goes on, and it is fortunate that it does so, with very little help from mother or nurse.[1] The child's own activity, if he is healthy and robust, will urge him to use his eyes, his hands, and other organs in exploring things about him.

Nevertheless a good deal may be done indirectly to help on this process of acquisition. The mother has the control of the child's surroundings, and may do much to hasten or retard the development of sense-knowledge by a wise attention to them or an indolent neglect of them. To supply children from the first with suitable materials for the exercise of their sense-organs, more especially those of touch and sight, is the first and probably most important part of what is meant by training the senses, at least in very early life. Next to this comes the more direct co-operation of mother, nurse, or teacher in directing their attention to unobserved points in objects, and in arousing interest in things by appealing to the impulses of curiosity, and so on. It may be added that a large part of the gain of such co-operation is realised independently of any methodic procedure. There are no rules of good observation which would enable one to teach it as an art. A child will profit more by daily companionship with an acute observer, be he teacher or playfellow, than by all systematic attempts to train the senses. A boy privileged to be the companion of his naturalist father in his daily walks will insensibly fall into the way of attending to the phenomena of nature, of being on the look out for things.

[1] Of course a good deal is done *undesignedly* in training the senses of the child. Thus he tends from the first to follow the lead of others, to inspect what they are looking at and talking about.

The training of the senses ought to begin very early in life, and a good part of it should be got over before the child comes under the more systematic discipline of the school. In the nursery he should have his discriminative sensibility exercised by the supply of a sufficient number and variety of sense-impressions. Thus a number of coloured objects should be placed before him, so that he may gradually distinguish shades of colour. The differences must first be wide and striking, smaller ones being introduced as the discriminative power of the sense advances. And here the mother will do well to bring the colours to be distinguished into juxtaposition, so that the attention may easily pass from one to the other, and the differences be carefully marked.[1] With variety should go a certain repetition of previous impressions, so that they may become familiar and be easily identified. All the senses should be exercised according to their relative importance. And this means that the child should be allowed the utmost possible liberty of action in handling things, examining their surface, their internal structure, and so on, and also in moving about so as to bring the muscular sense into full exercise. As we have seen, an important part of the knowledge of material objects is directly gained through the exercise of the muscles. The young child delights to exercise his, and finds a large part of his pleasure in investigating by his own active experiments the qualities of bodies. Not only so, the very play of the child may be turned to good account in furthering sense-knowledge. There is no toy he tires of less rapidly than a box of bricks. And the manipulating of these with a view to construction, is an excellent means of ascertaining the form of objects.

By thus supplying food for his active impulses as well as his senses we are putting the child in the way of co-ordinating his experiences of movement and touch on the one hand, and of sight on the other, and so of arriving at a rapid automatic recognition of things by sight alone. As has been said, sight takes the lead in observation, and when once the visual signs of position, solid figure, and magnitude and nature of surface have been learnt, the training of the observing powers will consist mainly in exercising vision.

[1] A special chart of colours suitable to the education of the eye has been published by H. Magnus of Breslau, under the title, *Tafel zur Erziehung des Farbensinnes.*

Objects must be brought before the child's eye in sufficient variety, so that the stimulus of change and novelty may be introduced, and the power of readily discriminating one thing from another be strengthened. On the other hand, there must be a certain measure of permanence in the young inquirer's environment, in order that the deeper sort of curiosity may be awakened, the observation of things grow in depth, and the power of rapidly identifying objects be exercised. A young child may easily have a redundance of good things in the shape of new toys, new picture-books, &c. In like manner, he may easily be taken about too much and shown too many sights. A habit of close inspection presupposes a certain measure of familiarity with things, and a certain depth of interest which only comes of daily companionship with them.

The school may be made a field of exercise for the senses in a number of ways. In the regulated play of the Kindergarten the senses are rightly the thing most attended to. Froebel has built on solid psychological ground in maintaining that knowledge and activity are closely related, that the child's spontaneous activity is the force that sets the mechanism of the senses in movement, that perception includes the employment not only of the eye but of the hand, and that a nice perception of form is only gained in connection with the device of manual reproduction. The well-known active employments of paper-folding, stick-building, and better still, modelling, train the sense of form by compelling a close attention to it in a way that no mere presentation of an object to passive contemplation could do.[1] Nor is this all: the execution of the required manual movements in all such simple constructive employments helps to bring out more prominently the correspondence between the visual and tactual experiences concerned in the perceptions of form. The same line of remark applies too to drawing. An experienced draughtsman reads more than another man into the forms submitted to his eye.

The vast importance of a fine perception of form may suggest that every child should undergo a systematic training of the eye in this particular. Such training would of course begin in the nursery

[1] In the same way the colour-sense is best trained by painting, the sense of pitch in sound by singing.

by presenting a variety of concrete forms to the child's notice as, those of animals, plants, &c. Striking differences, as that between an elm and a cedar, would be at first selected, and then finer differences, as that between an oak and a beech, introduced. Uncoloured drawings, supplementing the objects themselves or models, would be useful here as removing the more interesting feature of colour. After a sufficient amount of exercise in discriminating concrete forms, and when the powers of attention were strong enough, the more abstract consideration of form by observing the less striking form-elements should be encouraged. Lines, curves, and their simpler combinations would now be learnt. Finally, this synthetic treatment of form should go on hand in hand with an analytic treatment of concrete forms of objects. The pupil should be led on to discover the vertical line, the spiral curve, the triangular figure, &c., in natural or artificial objects, as the tree-stem, the coiling vine tendril, the house-gable. In this way, the perception of concrete forms would grow in distinctness.[1]

An appeal to children's own observation is now rightly resorted to as much as possible in every branch of instruction. The teaching of Natural Science sets out with the object lesson, which in its simplest form is a mere exercise of the pupils' observing powers in noting the properties of a thing. Whatever the difficulties of the object lesson nobody really doubts that a large amount of valuable knowledge about simple substances, as chalk and coal, natural forms, as those of plants and animals, as well as art products, can be given to a number of children in this way. This first-hand knowledge of things through personal inspection is worth far more than any second-hand account of them by description. Hence the desirability of using models and maps in teaching geography, of pictures in teaching history, and of such an apparatus as Mr. Sonnenschein's in teaching the elements of number. Yet while the senses may thus be appealed to in almost any branch of instruction, they are far more concerned in some departments than in others. It is now generally admitted that the careful and thorough study of one or more of the natural sciences supplies the most efficient training in sense-observation. It is plain for

[1] Mr. Spencer insists on beginning with concrete forms, even in teaching the child to draw, *Education*, Chap. II., p. 80.

example that a wide observation of the characters of plants as required by botany must tend greatly to sharpen the sense of colour and form.

APPENDIX.

For a fuller account of the way in which we learn to localise impressions and perceive objects the reader is referred to Prof. Bain's treatise, *Senses and Intellect*, under 'Sense of Touch,' Sect. 13, &c.; under 'Sense of Sight,' Sect. 12, &c.; and later, under 'Intellect,' Sect. 33, &c.; also to the excellent analysis in Mr. H. Spencer's *Principles of Psychology*, Vol. II., Pt. VI., Chaps. IX. to XVIII. With these may be compared M. Taine's interesting chapter on External Perception and the Education of the Senses, *On Intelligence*, Pt. II., Bk. II., Chap. II. For a knowledge of the current German theories of space-perception the reader should consult Lotze, *Metaphysic*, Bk. III., Chap. IV.; Wundt, *Physiolog. Psychologie*, Vol. II., Cap. XI. and XIII.; Stumpf, *Ueber den psychologischen Ursprung der Raumvorstellung;* and *Mind*, Vol. III., 1878, pp. 1, 167.

On the practical side of the subject, the training of the Senses, the reader will do well to consult Mr. Spencer's *Essay on Education*, Ch. II., and Miss Youmann's little work on the *Culture of the Observing Powers of Children.* The difficult subject of the Object Lesson is dealt with in a suggestive way by Dr. Bain, *Education as a Science*, Chap. VIII., p. 247, &c.; and by Mr. Calkins, *New Primary Object Lessons* (Harper & Brothers), p. 359, &c. The German reader may with advantage read Waitz, *Allgemeine Pædagogik*, 2nd Pt., 1st Section, 'Die Bildung der Anschauung'.

CHAPTER VII.

REPRODUCTIVE IMAGINATION (MEMORY).

After-effects of Perception. Perception is the great primal source of knowledge. But the act of perception is momentary, and there would be no enduring knowledge of things if we were limited to sense-cognition. The existence of such lasting knowledge depends on the fact that the impression made on the mind in the act of perception persists after the removal of the object.[1] In other words the percept is in a manner retainable. The form in which it appears after the removal of the object is known as a mental image or representative image.[2]

Temporary Persistence of Percepts: After-percepts. Percepts leave a temporary effect behind them. The perception of a bright object is often followed for

[1] 'Percept' and 'impression' are used much in the same sense in reference to this after-effect.

[2] The term image in psychology points to a double distinction. On the one hand it is representative whereas a percept is presentative (or largely so); on the other side it is a representation of a concrete object, or a mental picture, and is thus distinguished from a concept or general notion which typifies a class of things. The term 'idea' is commonly used to include both images and concepts, marking off the whole region of the representative from the presentative. But like the term notion, it tends now to be confined to concepts.

some seconds by what is known as an 'after-image,' but which may be better marked off, perhaps, as an 'after-percept,' of the object. This after-image is due to the continuance of the process of excitation in the nerve-centres. Thus after looking at the disc of the setting sun, we often continue to see, whether the eyes be closed or open, one or more pale yellowish images or 'spectra' of the object.

These after-images just referred to are known as 'positive'. They are distinguished from 'negative' after-images which arise from a temporary fatigue and disablement of the retina, either as a whole or in some of its elements. The first effect is illustrated by the transformation of a positive after-image of a bright object, say the window, into a black image. The second effect is illustrated by the familiar coloured images known as complementary spectra.[1]

The (positive) after-images, or after-percepts, are phenomena of great psychological interest in relation to mental reproduction. They form the connecting link between percepts and images properly so-called (revived images). They approximate closely to complete percepts in respect of their psychical marks, namely, vividness or intensity,[2] distinctness of parts, and definiteness of localisation (either in the field of objects if the eyes are open, or in the dark field if they are shut). The chief difference consists in this, that they appear to shift their position in the field of view with every movement of the eyes. This is owing to the fact that they depend on a (relatively) permanent state of the retina, and not on the immediate action of an external stimulus.

Temporary Mental Images. In addition to these after-images, which are only occasional and fugitive, every vivid and distinct impression begets a mental image, properly so called, which endures for a much longer period. Thus after seeing a friend the image

[1] For a fuller account of the difference between positive and negative after-images, see my work *Sensation and Intuition*, Chap. III., pp. 40, 41.

[2] The vividness of an after-image, as of the mental image to be spoken of presently, seems to refer more particularly to the degree of luminosity and force of colouring (degree of saturation) present in the image or represented by it

of his face lingers in consciousness awhile, and continues for some time to revert of itself as soon as other objects of attention are removed. This temporary image may be observed to become little by little blurred and indistinct. There is thus a gradual subsidence or dying away of percepts.

Though shading off into the other when it occurs, the after-image or after-percept may be readily distinguished from the temporary mental image proper. The latter is less vivid and distinct, and when definitely localised (as it is in the early stages) it is fixed in some region of external space (corresponding to the place where the actual object presented itself).

This temporary persistence of percepts as images is a matter of great importance in the apprehension of all successions or series of impressions, as those of sound, and in the perception of Time. If the impressions *a, b, c, d, e* follow one another, the grasp of the whole as one series implies that the earlier members of the series *a* and *b* persist when the later ones (*d* and *e*) occur. It is supposed that the range of our grasp of successive impressions (as those of sound produced by a series of pendulum oscillations) is limited by the persistence of such impressions. According to the researches of Wundt the maximum range of such combining consciousness is 12 distinct impressions. (*Op cit.*, Cap. XV., § 3.)

It may be added that this temporary persistence of a percept as an image underlies many of the lesser acts of what is popularly called remembering. Thus in carrying a message to a person a child has the sound of the words persisting in his mind for a few minutes. And this persistence makes the work of retaining and repeating easy.[1]

Persistence and Revival of Impressions. This temporary 'echo' of impressions is, however, of little account for knowledge. When we talk of picturing or mentally representing an object we imply a mental capability of having permanent images, as distinguished from the temporary ones just spoken of. That is to say, we suppose an ability to recall, revive or recover a past impression *after an interval.* All such

[1] On the rapidity of this subsidence, see Stumpf, *Tonpsychologie*, p. 230.

revival of percepts is known in Mental Science as Imagination. Thus we imagine when we call up a mental picture of a person's face or of a particular church, when we recall a particular word, or the taste of a certain fruit. Since visual perceptions constitute the most important kind of sense-knowledge, visual images form the chief part of our mental representations. Hence the employment in psychology of the term 'image' for all varieties of representation.[1]

This revival of impressions or presentations has, as its physiological conditions, the modification of the centres in some way and the production of 'a physiological disposition.[2] Owing to this, though excitation of the centres can take place at first only through some peripheral stimulation, it may subsequently become independent of it. Milton mentally picturing scenery after he had lost his sight, and Beethoven representing musical sounds after he had lost his hearing, are striking illustrations of this surviving central effect of external stimulation.

While we thus distinguish between the temporary after-effects of perception and the revival of percepts, or between temporary and permanent images, we must not overlook the connection between them. Speaking generally, we may say that the revival of

[1] We are wont to speak indifferently of the revival or reproduction either of the original impression or of the derived image. Were it not for this fixed usage of speech, it might be best, perhaps, to describe the process either as the reproduction or revival of the percept or presentation, or as the appearance or occurrence of the image (after an interval). Since this process means the calling up in the mind of a representation of some object, we are apt in everyday language to talk of it as a recalling of an object or incident.

[2] See above, p. 55.

an impression is more perfect soon after its actual occurrence, and becomes less perfect as the interval increases. We can commonly recall with ease, and in a considerable degree of distinctness, a face or a tune that impressed us a few days before, though after the lapse of a month or six months the mind loses its hold on the impression. Images may be said (roughly) to lose in vividness and distinctness in proportion to the remoteness of the corresponding percepts.

Reproductive Imagination. The simplest kind of imagination is that in which the several parts of the representation follow the order of perception. This is known as Reproductive Imagination. What is commonly understood by Memory, that is to say the recalling of *particular* impressions and pieces of knowledge (as distinguished from the retention of general truths) thus falls under the head of reproductive imagination. Another variety of imagination which answers more closely to the popular use of the term will be discussed in the next chapter.

Retention and Reproduction. It is customary to distinguish the stage intervening between the perception and the representation as that of *Retention* or *Conservation;* and the process of representation itself as that of *Reproduction.* Impressions, it is commonly said, must be laid up in 'the store-house,' or the 'pigeon-holes' of the mind before they can be brought forth and made use of by the reproductive faculty.[1] It is a point of dispute as to what the retention as distinguished from the reproduction, of an impression in-

[1] For an account of the various ways of conceiving and describing the fact of retention, see Hamilton's *Lectures on Metaphysics*, Vol. II., Lect. XXX.

volves. Without discussing this question we may distinguish retention from actual representation as the capability of representing. If a child retains an impression for a week, this implies that he has been capable of representing it at any time during this interval.

This is not strictly true, since we often recall impressions in special circumstances (*e.g.*, in excited moments, or moments of exceptional brain-vigour) which we were before unable to recall. Still if an impression is recalled after an interval we may safely assume the *possibility* of recall during the interval, provided certain conditions are realised.

The nature of retention is conceived differently according to the general conception of mind, and of its relation to body. Those who hold that there is a large region of unconscious mind below the threshold of consciousness are wont to talk of presentations as sinking below the level of consciousness but still existing, and ready to rise above the level again (see above, p. 74). Others again who are disposed to rely on purely physiological considerations in accounting for psychical phenomena, conceive the only persisting residuum of the presentation when it drops out of consciousness to be the modification of the nerve-structures concerned. According to these writers the essential fact in retention is an organic property.[1]

Images how distinguished from Percepts. We have no difficulty in general in distinguishing between an actual perception and an imagination of a thing.

[1] The former view is common among German psychologists, especially the Herbartians. It is briefly summarised in the following quotation from an article by Mr. James Ward (*Journal of Speculative Philosophy*, Vol. XVII., No. 2):—"What, now, do we know concerning this central image in the intervals when it is not consciously presented? Manifestly our knowledge in this case can only be inferential at the best. But there are two facts, the importance of which Herbart was the first to see, from which we may learn something: I refer to what he calls the rising and falling of presentations. All presentations having more than a liminal intensity rise gradually to a maximum and gradually decline; and when they have fallen below the threshold of consciousness altogether, the process seems to continue, for the longer the time that elapses before their 'revival,' the fainter they appear when revived, and the more slowly they rise. This evanescence is most rapid at first, becoming

We instantly feel the difference between looking at an object, as a horse, and forming a mental picture of it when it is absent. We roughly define the difference by saying that the image is the copy of the percept, that it is less vivid, and less distinct in its parts.

This distinction is by no means the whole, otherwise we should confuse a faint and indistinct percept (*e.g.*, the sight of a very distant, or of a badly lit object) with an image. Among other distinctive marks of percepts and images are the following: The former do not depend on our will, while the latter do, to a considerable extent at least. We cannot help seeing an object if it is present and our eyes are fixed in the required direction, but we can (usually) banish an image by a diversion of the attention. On the other hand percepts depend on movements (of the sense-organ and body) while images do not. An image persists whether we turn our eyes to the right or to the left, and (as a rule) is very imperfectly localised in space. Again percepts occur suddenly, and cease as suddenly, whereas images rise and subside gradually. These and other points of contrast suffice in general for the distinguishing of them. But in exceptional circumstances as in sleep where percepts are wanting as a corrective to the images, and where the latter attain an unusual degree of vividness and persistence, we confuse them.[1]

The central nervous structures engaged in percepts and images are supposed to be the same. The seat of the percept is the seat of the image. The difference appears to be that in the latter case the excitation

less as the intensity of the presentation diminishes. It is too much to say that this holds with mathematical accuracy, although Herbart has gone this length. Still, it is true enough to suggest the notion that an object, even when it is no longer able to influence attention, continues to be presented, though with ever less and less absolute intensity, till at length its intensity declines to an almost dead level just above zero." A similar hypothesis was propounded by Sir W. Hamilton, under the title 'Latent Mental Modifications' *Lectures on Metaphysics*, Vol. II., Lect. XXX.). The latter view respecting retention, that it is fully explained by a reference to the properties of the nervous substance, is represented by Dr. Maudsley, and others.

[1] The difference between actual impressions and images, and the circumstances favouring the confusion of the two are fully given by Taine, *On Intelligence*, Part I., Book II., Chap. I.; and, Part II., Book I., Chaps. I. and II.; *cf.* Horwicz, *Psychologische Analysen*, Theil I., Sect. 50.

is less strong, and has a narrower range, being confined to the central nerve structures and not reaching to the peripheral regions.[1]

Images involved in Percepts. Just as in mature life we rarely or never have a sensation without some admixture of the representative element which constitutes it a percept, so we rarely if ever have a percept in which an image is not embodied. Since to *recognise* an object is to identify it with some object previously seen, it is plain that all recognition involves the co-operation of an image, the product of the previous act of perception. When a child sees a familiar person, as his nurse, the percept is overlaid with a whole series of images. That is to say, there coalesce with the percept the residua or traces of previous percepts.

Such a nascent undeveloped state of an image must, however, be distinguished from an image proper, that is to say one distinct and fully developed. We are often able to identify an object, as a face, when we actually see it, without having any corresponding power of imaging it when it is absent. A dog will recognise his master after years of separation, but it is doubtful whether he could distinctly picture his appearance in his absence. The power of identifying objects is independent of the power of picturing them, and is often found in great perfection where the latter is very imperfect.[2]

[1] For the proof that presentation and representation involve the same central structures, see Prof. Bain's *Senses and Intellect*, 'Intellect,' Chap. I., § 7, and following. See also the interesting facts quoted from Wundt, Appendix D ('Seat of Revived Impressions').

[2] So far as I have been able to observe, I should say that this is true of many persons addicted to scientific pursuits or abstract studies.

Interaction of Images and Percepts. The fact that a percept contains an image in a nascent form has been illustrated in a striking manner by the experiments already referred to under the head *Expectant Attention.*[1] The process of preadjusting attention to an impression plainly involves the pre-existence in the mind of the corresponding image. And the expediting of the process of perception (or what is known as the 'reaction-time') suggests that perception takes place by a coalescence of an impression (or group of impressions) and an image, which last factor in the process is in this case already completed through the very attitude of expectancy.[2] In this way images act upon, condition, or assist in producing percepts. The most signal instance of the furtherance of percepts by images is that under certain circumstances the percept *occurs too soon*—that is to say, the impression is referred to a moment slightly in advance of that of its actual occurrence—owing to the pre-existence of the image which combines or fuses with it.

We may say then that there is a reciprocal action or interaction between percepts and images. On the one hand images evidently depend on percepts, being indeed survivals of these. And they not only have them as their remote conditions, but in many cases (as we shall see presently) they have them also as their proximate conditions; that is to say, they are called up or suggested by actual impressions. In this way the external order of presentations determines the internal order of representations. On the other hand, in normal as well as abnormal circumstances, images may react on percepts, and the inner order of representation to a certain extent interfere with or modify the external order of presentation.

Distinctness of Images. The chief merit or excellence of a representative image consists in its distinctness or clearness. By this is commonly meant that the image be definite and not vague, that the several parts or features of the object be distinctly pictured in their relations one to another. Thus we have a distinct image of a person's face when we call up its several features, as the outline or contour of the whole, the shape of the mouth, and the colour of the eyes. On the other hand the image is spoken of as

[1] See Chap. IV., p. 89.

[2] I have elsewhere called this preliminary process 'pre-perception'. (See *Illusions*, p. 27, *seq.*)

indistinct, obscure, or vague, when instead of all the details or lineaments of the object being pictured with sharp definition, only a few are represented, or when the details are pictured in a vague or hazy manner, as in the case of a blurred or half-effaced portrait.

Closely connected with the distinctness of images as just defined, is their distinctness in relation to other images. The expression "a distinct mental picture," seems often to imply detachment from other pictures. Thus we are said to represent a face "distinctly" when we do not confuse it with another face.[1]

The terms clearness and distinctness seem to be employed almost interchangeably for each of the above aspects of images. If it were possible to break through a habit of speech, it might be advantageous to use the antithesis clear—obscure with reference to the first kind of distinctness (distinctness of parts or details), and the antithesis distinct—confused with reference to the second kind (distinctness of the whole). The close connection between the terms distinct and clear will be illustrated again by and by, in connection with general ideas or concepts.

Our mental imagery shows all degrees of distinctness. Many of our representations are vague, blurred, and indistinct, and as a consequence tend to be confused one with another. The recent investigations of Mr. F. Galton into the nature of visual representation, or what he calls 'visualisation,' go to show that this power varies widely among individuals (of the same race), that many persons have very little ability to

[1] It is customary to distinguish between the liveliness or vividness of an image and its distinctness. For purposes of knowledge the latter is more important than the former. A certain degree of vividness in an image may lead on to hallucination. There may be a fair degree of distinctness with a comparatively low degree of vividness.

call up distinct mental pictures of objects as figured, coloured, &c.[1]

Definiteness and Accuracy of Images. From the distinctness of an image we must carefully distinguish its accuracy. By this is meant its fidelity as a copy, or its perfect correspondence with the original, the percept. Want of distinctness commonly leads to inaccuracy, if in no other way, in that of deficiency. But what we ordinarily mean by an inaccurate image includes more than this. It implies the importation of some foreign element into the structure of the image. Thus we have an inaccurate image of a face when we ascribe a wrong colour to the eyes, &c. It is probable that all images tend to become inaccurate, by way not only of loss, but of confusion, of elements, with the lapse of time. It is to be added that though there is confusion here, there need be no sense of confusion as there is in what we commonly call a 'confused image'.

Conditions of Reproduction. The capability of representing an object or event some time after it has been perceived depends on two conditions. In the first place the impression must be stamped on the mind with a certain degree of force. This circumstance may be called the depth of the impression. In the second place there is needed in ordinary cases the presence of something to remind us of the object or to suggest it to our minds. This second circumstance is known as the force of association.

[1] Among the curious results reached by Mr. Galton are the following. Men given to abstract thinking are as a rule weak in visualising power. The capability does not vary apparently with keenness of sight (perceptual power), nor with the power of dreaming. (See his *Inquiries into Human Faculty*, 'Mental Imagery,' p. 83, &c.)

(A) **Depth of Impression: Attention and Retention.** In the first place then (assuming that there has been only one impression) we may say that a distinct image presupposes a certain force and distinctness of the impression. A loud sound will in general be recalled better than a faint one; a bright object distinctly seen, better than a dull one obscurely seen. For this reason actual impressions are in general much better recalled than products of imagination. We recall the appearance of a place we have actually seen better than one that has been described to us. The habit of repeating words audibly when we want to remember them is based on this principle.

Again, the permanence of an impression is determined not merely by its external character but by the attitude of the mind in relation to it. If our minds are preoccupied a brilliant object may fail to make a lasting impression. Hence we have to add that the permanence of an impression depends on the degree of interest excited by the object and the corresponding vigour of the act of attention. Where a boy is deeply interested, as in watching a cricket match, he remembers distinctly. Such interest and direction of attention ensure a clear discrimination of the object, both in its several parts or details, and as a whole. And it is on the fineness of the discriminative process that retention appears mainly to depend.

The interest determining the force of attention may, as we have seen, arise directly out of some aspect of the object, as its novelty, beauty, its suggestiveness, and so on. A pleasurable feeling springing up in the very process of perception is the best guarantee of close attention and fine discrimination.[1] The events of early childhood which are permanently retained commonly show an accompaniment of strong feeling (wonder, delight, awe, and so forth). Where this powerful intrinsic interest is wanting a vigorous effort of voluntary attention may bring about a permanent retention. But this is hardly as effective as the first. We find it hard to retain an impression, however closely we attend to it, if it fails to arouse some degree of pleasurable interest.

Finally it is to be observed that our minds are not always equally susceptible to this process of stamping in impressions. Much will depend on the degree of mental vigour and brain vigour at the time. A fresh condition of the brain is an important element in the retention of impressions.

Repetition and Retention. We have just assumed that the object or event represented has been perceived but once only. But a single impression rarely suffices for a lasting representation. Every impression tends to lose its effect after a time. The surviving image grows faint and indistinct unless it be re-invigorated by new impressions. Most of the events of life are forgotten just because they never recur in precisely the same form. The bulk of our mental imagery answers to objects which we see again and again, and events which repeatedly occur. Here then

[1] This is true within limits only, for, as has been remarked above, strong emotional excitement is unfavourable to nice discrimination. Powerful feeling seems to stamp impressions on the mind simply by the added strength it gives to attention, and independently of the degree of intellectual (discriminative) activity called forth. (On the precise relation of discrimination to retention, see Stumpf, *Tonpsychologie*, pp. 287-289.)

we have a second circumstance determining the depth of an impression. The more frequently an impression is repeated the more enduring will be the image. Where the repetition of the actual impression is impossible, the repeated reproduction of it serves less effectually to bring about the same result. We are able to remember permanently a few events of early life by going back to them from time to time and so freshening the images of them.

While we thus speak of the repetition of an impression we must not forget that the perfect and exact reduplication of a presentation is a comparatively rare occurrence. Familiar visible objects as the figures of our friends, undergo considerable changes of aspect (see above p. 199). Even what we call one and the same impression of sound, as that of a word, presents itself with varying degrees of intensity, and differences of quality (timbre) according to the force employed by the speaker, and the character of his voice. It follows that our seemingly simple images are in a measure composite. This fact will be referred to again by and by.

Frequency of Repetition. It is important to add that it is not the mere number of repetitions which determines the final depth of the impression; it is the frequency of the repetitions. As has been remarked, every impression loses its effect after an interval. In order then that a second impression A_2 may add something to the effect of the first A_1 it must occur before this interval has expired. Only in this way can there be a cumulative effect. In learning a new language we may look up in a dictionary an uncommon or rarely occurring word, and a common or frequently recurring word exactly the same number of times, and at the end retain the latter but not the former. The process may be likened to that of damming a stream with stones. If we throw in the stones with sufficient rapidity, we may succeed in fixing a barrier. But if we throw in one to-day, and another to-morrow, the effect of the first throw will be obliterated by the force of the stream before the reinforcing effect of the second is added.

These two conditions, a certain amount of attention, and a certain frequency of repetition, are both necessary to permanent retention. As we have just seen, repetition is commonly needed to supplement attention. And on the other hand mere repetition without attention is ineffectual. We cannot distinctly represent even such a familiar object as a friend's face unless we have carefully attended to its several features.

It may perhaps be said that these two conditions are ultimately reducible to one. Whether an impression has occurred once or more than once the degree of perfection of the retention and reproduction will be determined by the amount of attention bestowed on it. The only difference is that in the one case a certain amount of attention is given at one time, while in the other case it is given at different times. It does not follow from this, however, that the effect will be quite the same if we bestow a certain quantity of attention on a thing at one time, or distribute the same quantity over different times.

(B) **Association of Impression.** When an impression has been well stamped on the mind there remains a predisposition or tendency to reproduce it under the form of an image. The degree of facility with which we recall any object always depends in part on the strength of this predisposition.[1] Nevertheless this predisposition will not in ordinary cases suffice in

[1] The strength of this predisposition will, of course, be greatest in the case of recent impressions.

itself to effect a restoration after a certain time has elapsed. There is needed further something present to the mind to *suggest* the image, or remind us of the event or object.[1] Thus the sight of a place reminds us of an event which happened there, the hearing of a person's name of that person, and so on. Such a reminder constitutes the 'exciting' as distinguished from the 'predisposing' cause. The reason why so many impressions of our life, including our deeply interesting dream-experiences, appear to be wholly forgotten is that there is nothing to remind us of them.

Now we are reminded of an impression by some other impression (or image) which is somehow connected in our minds or 'associated' with it. Thus the event is associated with the place which recalls it, and the person with his name. Hence we speak of association as the second great condition of reproduction.

Different kinds of Association. One impression may be associated with another in different ways. Let A stand for the antecedent or reminder, B for the consequent or the representation called up. Then A and B may correspond to two objects locally connected, as two adjacent buildings, or to two events following one another in time, as sunset and the coming on of darkness. Or again they may stand for two like

[1] This at least is true of the vast majority of our revivals. Whether there is ever a perfectly spontaneous revival, as for example in dreams, and in other exceptional conditions of mind, need not concern us here. Of course the suggestive force is often of the slightest, as in the case of the most frequently recurring and familiar objects (our friends, and so on), the images of which are ready to start up at any moment.

objects, as a portrait and the original. These various kinds of connection are reduced by the psychologist to the smallest number of principles or laws of association.

Association by Contiguity. Of these kinds of association the most important is that known as contiguous association, or Association by Contiguity. By this is meant the association of two or more impressions through, or on the ground of, their connection in time. Its principle may be stated briefly as follows: Presentations or impressions which occur together, or in immediate succession, will afterwards tend to revive, recall, or suggest one another.[1]

It is obvious from this bare statement of the principle of Contiguous Association, that it implies two facts and a relation of dependence between them. First of all we have a fact of the external order, the presentation, simultaneously or in close succession, of two objects. This is marked off as the conjunction of impressions. Secondly, we have a fact of the subsequent internal order, the appearance or occurrence together of the corresponding images. The term 'association' properly applies not to the conjunction of impressions in itself, but to the connection of images resulting from this.[2]

[1] This law applies also, as we have seen, to other mental states, namely feelings of pleasure and pain, and actions, being indeed, a general principle of mental development (see p. 50). For the present, however, we are only interested in its application to intellectual phenomena, or presentations.

[2] The reader should note the ambiguity in the current phrases 'association of impressions,' or 'of objects'. As the classical phrase 'association of ideas' shews, the term association refers directly to the resulting relation of the representations.

We see at once that this kind of association covers not only the connection of contemporaneous or successive events, such as the flash and the sound of an explosion, the flow and ebb of the tide, but also that of cause and effect, and of objects in space as co-existent. For the relation of cause and effect clearly makes itself known through a connection in time. And it is easy to see that we observe the local relations of objects by repeated successions of percepts. Thus we know the situation of a building in relation to its surroundings by successive acts of attention: we know the situation of a town or of a river relatively to adjacent places by moving from one to the other.

Law of Contiguity. In order to understand more precisely what is meant by the Law of Contiguous Association, we may let A and B stand for two impressions (percepts) occurring together, and *a* and *b* for the two representations answering to these. Then the Law asserts that when A (or *a*) recurs it will tend to excite or call up *b*; and similarly that the recurrence of B (or *b*) will tend to excite *a*. Thus the actual sight of a person or the mental picture of that person calls up the image of the place where we last saw him. It is to be added that the actual impression A will tend to call up *b* more powerfully than the representation *a*. Seeing a place will bring back an occurrence that happened there much more certainly and forcibly than merely imagining that place.

If instead of two simultaneous percepts or impressions we take two successive ones the same thing occurs. Only it is to be remarked here that the antecedent tends to call up the image of the consequent more forcibly than the consequent the image of the antecedent. This truth is illustrated in the familiar difficulty of repeating the alphabet backwards.

Finally what is true of two percepts or impressions is true of any number. Of a whole group of contemporaneous events any one may call up the image of any other. In the case of a series of events each link tends to call up the adjacent links, the consequent more forcibly than the antecedent.

The physiological basis of this contiguous association seems to be the fact that two nerve structures which have repeatedly acted together, acquire a disposition to act in combination in the same way. This fact is explained by the hypothesis that such a conjoint action of two nerve centres somehow tends to fix the line of nervous excitation or nervous discharge when one centre is again stimulated in the direction of the other. In other words paths of connection are formed between the two regions. But it may be doubted whether physiologists can as yet give a satisfactory account of the nervous concomitants of the associativ process (see above p. 55).

Degrees of Associative Force. The Law of Contiguity speaks of a *tendency* to call up or suggest. This means that the suggestion does not always take place, that A is not always followed by *b*, and that in some cases it is much more prompt than in others. We may easily see by observation that this is so. Thus we sometimes hear names of persons and places without representing the corresponding objects, in other words the names do not call up the appropriate images. In other cases, again, the revival is certain and rapid, as when a familiar word in the native tongue as 'home,' 'father,' calls up its image. Indeed in a certain class of cases the revival is so rapid that the mind is hardly aware of a transition from antecedent to consequent. Such are the suggestions of a vocal action by the connected sound (articulate or musical), of a manual movement by a visible sign or signal, and of a feeling say of anger, by the visible expression. We express this fact by saying that there are various degrees of associative or suggestive force.

On what Associative Force depends. The associative force in any case depends mainly on the same two circumstances as we found governing the persistence of impressions regarded as single or apart. These are first the amount of attention given to the impressions A and B in conjunction; and secondly the frequency of their concurrence. After what has been said as to the effect of these circumstances on single impressions, a word or two will suffice to illustrate their effect on conjunctions of impressions.

(A) **Connective Attention.** Two (or more) impressions may become closely associated with one another by a special act of conjoint attention at the time. Thus a child sees a stranger and hears his name, and by attending closely to the two things together, and in their connection, his mind in a manner makes one object of them, so that the recurrence of the one suggests the other. A place vividly recalls some pleasurable or painful incident which happened there, just because the mind being greatly excited at the moment threw a special force of attention into its perceptions, seizing the several parts of its surroundings in one comprehensive glance. A voluntary concentration of mind on a plurality of objects or events in their connection one with another will, to some extent, effect the same result.[1] The greater the force of attention directed to two objects, and the more closely the mind connects them by one act of attention, the stronger will be the resulting association.

It follows from this that the order of our representations is not wholly determined by the external order. We ourselves determine this order to some extent by the direction we give to our attention. Our interest in the objects presented is an important factor in fixing the special mental connections formed. This may be seen by comparing the dissimilar internal results of the same external order of impressions on different minds. Two persons, say an uneducated, and an educated man, will give very unlike accounts of an incident which they have witnessed or of a speech which they have heard. In the former case the path followed by the attention in watching the event or listening to the discourse (which in this instance is determined largely by external forces, or degrees of impressiveness), shows itself in the want of any logical connection in the several parts of the recital. In the latter case the path of attention (here largely voluntary and determined by a desire to piece together and understand) shows itself in the presence of such a logical connection in the narration.[2]

[1] On the nature of such a comprehensive act of attention see above, pp. 78, 100.

[2] The dependence of the representative order on the direction of attention has been recently emphasised by Mr. James Ward in a paper which is unfortunately not yet accessible to the general public. He expresses this by saying that the memory-continuum (or order of representations) is "determined by the movements of attention".

(B) **Repetition and Association.** It is however but rarely that a single conjunction of two experiences effects a permanent association. Repetition of the original experiences is necessary in the great majority of instances. All our enduring knowledge about the things around us, such as the persons and places we are familiar with, the permanent natural objects, sun, moon, and stars, together with their movements, actions, or changes, owes its persistence to a number of recurring conjunctions of impressions. The more frequent the conjunction of two percepts or impressions the stronger the resulting bond of association between them. The closest associations, such as those between vocal actions and the resulting sounds, words and the things named, the movements of expression and the feelings expressed, are the result of innumerable conjunctions extending throughout life.

It is to be observed that the order of our presentations varies greatly at different times. Thus we find the same animal form with different colours: we encounter persons in different places; and we come across words and phrases in different connections. So far as this is the case, no firm associations are possible. The dissimilarities of the concomitants tend to counteract one another, and the image of the object is not associated with any one of them. On the other hand, the fixed order of nature, and of human life, implies uniformity in variety, a certain amount of repetition, along with much variation, of concomitants. This is illustrated in the uniform relation between natural phenomena and their conditions, between human actions and certain corresponding circumstances and motives, and between words and their grammatical connections. It is by the aid of this cumulative effect of many repetitions that the mind comes gradually to disentangle these uniformities of connection among things.

Relation of Repetition to Attention. It would seem to follow from the above that the degree of associative force in any case will vary as the sum of the quantities of conjoint attention given at different times. In other words, it will be represented by the product of the number of repetitions and the average degree of attention called forth.

It is to be observed, however, that the degree of attention called forth at any time depends in part on the frequency of the repetition. We do not attend to oft-recurring and customary conjunctions. A certain measure of familiarity deadens interest, and leaves the attention slumbering.[1] Conjunctions which struck us as odd at first, as that of a person having an unsuitable name, cease in time to be attended to at all. On the other hand, repetition is sometimes a condition of attending to a conjunction. The attention is here called out by the very fact of a repetition, or a recurring similarity in our experiences. This applies to the recurring conjunctions of natural phenomena just touched on. We only notice these, as a rule, after a good many repetitions.[2]

Different Forms of Contiguous Association. From a consideration of these conditions of contiguous association, we can see that the result will differ in different classes of cases, that is according to the nature of the impressions, or the way in which they are presented together.

For example, though impressions connected in the time-order, and those connected in the space-order both illustrate the action of contiguity, they illustrate it in a different manner. In the case of two fugitive impressions, as the sound of a horse's hoofs and the sight of the animal, the attention is momentary only. And, if as commonly happens, one succeeds the other, the movement of attention is fixed to one order, that is to say from antecedent to consequent, and not conversely. Hence the fact already touched on that successive impressions, as the letters of the alphabet, or the words of a poem, can only with great difficulty be called up in the reverse order. On the other hand when two objects are collocated in space, as Richmond Hill and the Thames, the attention can be prolonged, pass indifferently from the

[1] As will be seen by and by, the effect involves in this case the discovery of similarity amid variety, constancy amid change.

[2] See above, p. 85.

first to the second, or in the reverse order, and finally comprehend them in a single (or approximately single) act. Hence in this case, the representations call up one another with equal force, and appear rather as parts of one representation.

Again the connection formed between representations will differ according as the presentations are homogeneous or heterogeneous. As was remarked above, the attention passes more rapidly or easily from one impression to another like itself, than to a disparate one. Thus we can in general more readily connect two succeeding sounds than a sound and say a sight accompanying or following it. Heterogeneous association may thus be distinguished from homogeneous.

A very important variety of association depending on the peculiar action of attention, is that between signs and significates. A sign is some impression which has no interest for us except as a mark to denote, or recall to our minds, some object which is interesting. In learning his notes a child is not interested in the visual figures themselves, but attends to them solely in their relation to the sounds for which they stand. The result of this paramount interest in one member of a couple is that the sign tends to reinstate the representation of the thing signified with much greater force than that with which this last tends to suggest the first. When we see a person the image of his name may hardly be excited at all. But when we hear his name the image of the owner starts up instantly and uniformly. The full importance of this circumstance will appear presently when we consider the nature of verbal signs.

Some interesting statistical enquiries into the relative strength of different associations have been recently carried on by Mr. F. Galton in England, and by Prof. W. Wundt in Germany. Mr. Galton's researches show among other things that those associations (with words) recur most persistently which reach back to early life. Prof. Wundt's experiments aim at determining the relative *rapidity* of different kinds of reproduction. He found, as might be expected, that a familiar word, or one having a close association with some image or idea, recalls this much quicker than an unfamiliar word, or an isolated word not standing in a close connection. (Galton, *Inquiries into Human Faculty*, 'Psychometric Experiments,' p. 185, &c.; Wundt, *Physiologische Psychologie*, 2nd Ed., II., p. 279, &c.)

Trains of Representations. All that has been said respecting pairs of representations applies also to a whole series. A good part of our knowledge consists of trains of representations answering to recurring and oft-repeated series of presentations. Thus our knowledge of a street, and of a whole town, consists of a recoverable train of visual images. In like manner, we are able to recall a series of visible movements or actions, as those of a play, and a succession of sounds as those of a tune. Our knowledge of every kind is closely connected with language, and is retained to a considerable extent by help of series of words. Again our practical knowledge, our knowledge how to perform actions of various kinds, such as dressing and undressing, speaking and writing, is made up of numerous chains of representations.

All such chains illustrate the effects of attention and of repetition. The more closely we have attended to the order of a dramatic action, the better will the several links of the chain be connected. And the more frequently we have seen a play, or heard a musical composition, or written out a sentence, the easier will it be for the mind afterwards to run over the series. It is to be noticed that in the case of all such recurring trains the effect of repetition is to beget a powerful tendency to pass from one member of the series to the following members. The attention here moving in a habitual path, cannot easily arrest or fix any member of the series, but tends to be carried off to its successors.[1] The full effect of this repetition is to reduce the required amount of attention to a minimum. We take in a familiar tune, and repeat a familiar train of words in a semi-conscious or automatic way.

At first these trains of representations are not self-

[1] On the formation of such a tendency to move along habitual lines, see above, p. 89.

supporting. They are bound up with, and dependent on, actual presentations. Thus a child learning a tune is able at first only to recall the successive notes step by step as he hears the tune sung (or plays it himself). That is to say, revival is still dependent on the stronger suggestive force of actual impressions. Gradually the series of representations becomes independent. The child's mind, on the recurrence of the first notes, can move on in advance. Not only so, when the train is perfectly built up, he will be able to recall it as a whole without any aid from external impressions.

Composite Trains. Again, in nearly all cases of representative trains, we have to do not with a single series of elements, but with a number of concurrent series. For instance, our representation of a play is made up of a visual series, answering to the several scenes, movements of the actors, &c., and an auditory series, answering to the flow of the dialogue. The effect of repetition is here to bind together the several elements of each successive complex experience into one whole, and each of these wholes to succeeding ones. Thus each visible situation is firmly associated with the corresponding words, and this composite whole associated with what precedes and follows it. Frequent repetition tends here to consolidate each successive group into one mass, so that the whole series approximates to a single series. At the same time, a certain independence of the several concurrent series remains, since the attention is able to fix itself according to circumstances, now on one series, now on another. Thus in recalling a familiar play, sometimes the series of visual images is the prominent one, at other times the series of auditory representations.

Symbolic Series. An interesting variety of such composite trains is that of symbolic series. Here we have a chain of presentations or impressions of no interest in themselves, but employed as marks of other things. The visual symbols answering to musical or articulate sounds may be taken as an example. Here the first step in the process of association is to knit together firmly the several symbols or signs with the symbolised objects or significates. The degree of perfection attained here will depend on the careful discrimination of each sign and of each significate from other members of its respective class, and the connection of the two members of each couple by repeated acts of conjoint attention. When this point is attained the mind is able to recognise each symbol rapidly and with the slightest amount of attention, and to pass from this to the representation of the significate. Thus after thoroughly learning her notes a girl at once recalls the sound on seeing the visual symbol. So rapid does this process of interpreting symbols tend to become that at last the mind is hardly aware of attending to the symbol at all.

When this process of firmly coupling the separate symbols with their meanings or contents has been completed, there is a further process of association in binding together numbers of these couples in series. Learning the scale of printed notes, or the printed alphabet, may be taken as illustrating the process.

By the frequent repetition of such a train, each member at once calls up, and leads the mind on to, the succeeding one. Every successive going over the scales of note-symbols and sounds concurrently confirms this tendency, so that the learner gradually becomes independent of the presentations, and finally on the reinstatement of the initial members of the train, anticipates the whole succession.

Finally, the same influence of repetition is observable in the learning of definite groupings of such note-symbols, answering to particular tunes. Each repetition of the particular chain tends to confirm the attachments between the succeeding links. When the young learner has often gone over such a row of symbols she can read off the melody with more and more ease, and with less detailed attention to the members of the symbol-series; till at length by aid of a few initial members of the visual series she can recover the whole series of sound-representations. Even in the case of new tunes, the process of 'reading off' is greatly expedited by the reappearance of familiar successions of symbols, answering to habitual intervals, musical phrases, &c. Hence, the mind of a musician engaged in reading a new score, tends, by the aid of association and anticipation, to pass with great rapidity from symbol to symbol; the process of combining the symbols assumes something of an automatic character.[1]

Series of Motor Representations. Another group of these recurring composite trains of representations,

[1] In the construing of new groups of familiar symbols, there is a further process of mental construction, which will be described in the next chapter.

closely related to the last, are those answering to our repeated or habitual actions. Every voluntary movement presupposes a representation of that movement, or a motor representation. Before we stretch out the hand to take something we rapidly represent this action. Hence the performance of a series of actions is immediately supported by a series of motor representations. Not only so, along with this series there goes one or more series of sensory representations, namely, those of the sense-impressions immediately resulting from the several movements. Thus in walking there is not only the series of images answering to the muscular actions, but that answering to the sensations of contact due to the bringing of the feet alternately to the ground, and in most cases, too, that corresponding to the visual sensations arising from the changing appearances of the moving organ, and of the ground. So in singing or speaking, the series of vocal representations is bound up with one of auditory images.

In general the motor representations are weak as compared with the sensory. Hence the train of motor representations depends on the presence of the sensory elements. And so these last are analogous to symbols. They serve as the marks of the successive actions. Thus in writing the succession of manual movements is directed by the visual impressions. How much this is the case, may be known by the simple experiment of trying to write in the dark.

The effect of frequent repetition or practice is to dispense with that close attention to the detailed elements of such a composite train which was necessary at first. This is seen in the fact that the sensory elements which had first to be distinctly attended to, become indistinct. Thus a child learning her notes has at first to look at her fingers. Later on she can strike the notes with only an indistinct indirect glance at them. In this way practice tends, to a considerable extent, to render a chain of movements independent of sensory elements.[1] The series of actions approximates to an apparently single series, in which the sensation accompanying the execution of one step calls up a representation of the following, which is too fugitive to be distinguished from the subsequent presentation. The final outcome of this repetition is a habitual or quasi-automatic action in which all the psychical elements, presentations and representations alike, become indistinct.[2]

Verbal Associations. Among the most important of our associations are those of words. Language is the medium by which we commonly recall impressions. This arises from the circumstance that we are social beings, dependent on communication with others. A word is at once a passive impression and a vocal action. And this points to the two-sided

[1] That the sensory elements are still present as indistinctly recognised factors, is seen in the fact that a man who has lost skin-sensibility has to look at his feet in order to walk.

[2] It is a nice point whether in these rapid successions there is a momentary attention to each member of the series, though too fugitive to be afterwards remembered. Dugald Stewart held that this is so. On the other hand, Sir W. Hamilton considered this a case of 'unconscious' mental operations. See *Lectures on Metaphysics*, Vol. I., XVIII. ; *cf.* Mill's *Examination of Sir W. Hamilton's Philosophy*, Chap. XV. ; and Dr. Carpenter's *Mental Physiology*, Book II., Chap. XIII. (Unconscious Cerebration).

function of language as the medium of imparting and of receiving knowledge. The conditions of social life have as their result the intimate association of verbal signs and images generally. Hence words play a most important part in the revival of impressions. If, further, it is remembered that language is the medium by which all the higher products of intellectual activity are retained and recalled, its importance will be still more apparent.[1]

The value of our selected system of signs, articulate sounds, in relation to this function of recalling, depends on certain characteristics of the sensations concerned. As we saw above, sounds are finely distinguishable in their quality. Articulate sounds constitute a wide range of finely *discriminated* elements. Again, these elements are susceptible of being rapidly discriminated from one another when occurring in succession, and further of being grouped together and grasped as a whole series.[2] To this refinement of the auditory sense, there answers a considerable degree of delicacy in the muscular sensibility of the vocal organ, as well as a high degree of flexibility or capability of rapidly varying its actions.

It follows from this brief account of words that verbal associations will illustrate the characteristics of symbolic association and motor combination just described. The building up of verbal associations begins with the knitting together of the several elements entering into each verbal complex or word.

[1] The full use of language in (general) thinking can only be explained later on. Here it is enough to dwell on its service as a medium of *reproducing* knowledge both of concrete objects and of classes.

[2] See above, p. 206. It may be added here, as a fact in favour of an ear language rather than an eye or gesture language, that the former sense can distinguish two successive sensations separated only by an interval ·016 sec., whereas the latter cannot distinguish two impressions when separated by a smaller interval than ·047 sec. (Wundt, *Physiol. Psychologie*, II., Cap. 16, p. 261).

Here the first step is the linking of the vocal action to its respective sound. To this must be added, in the case of the educated, the combining of this pair with a visual symbol, more particularly the printed word.[1] Not only so, since words are symbols, of interest only as representing ideas, the building up of these verbal aggregates is completed by the firm attachment of the word-complex to the corresponding image or idea. Here, too, the general conditions of association hold good. The better the several elements, sounds, vocal actions, visual symbols and, finally, ideas, are discriminated from other members of their respective classes; and the closer and the more frequent the act of attention to the different constituents of each group or complex in their relation one to another, the firmer will be the association.

When this process of association is complete, any member of the verbal aggregate tends instantly to call up the others. But all the elements are not called up with equal distinctness in every case. To begin with, since the words are symbols, interesting only as standing for idéas, words tend in general to call up ideas more powerfully than these last to call up words. The sound or sight of a word, instantly carries the mind on to some image of an object. But we may have images of persons, places, &c., with only a very faint verbal accompaniment.[2]

[1] The other visual symbol, the written word, is only of importance in connection with the action of writing.

[2] The strong tendency of words to call up ideas is, however, counteracted in certain cases. Like human representatives, words tend to become the substitutes of that for which they stand. This will be touched on by and by.

Not only so, all the elements of a verbal aggregate are not always called up with equal distinctness. Thus when listening to the words of another the mind (if interested) is instantly carried on from the sounds to the ideas, and there is only an incipient resurgence of the images of the vocal actions. On the other hand, in speaking, or reading out from a book, the vocal representations become much more distinct.

It follows that in our wholly internal mental processes of representation, different verbal elements will be called up at different times. In general the most distinct verbal accompaniments of images are representations of sounds: those of the corresponding vocal actions are (according to what was said above respecting motor representations generally) much less distinct. But much will depend on differences of past experience. Ideas which we have acquired by reading will tend to be accompanied by pictures of the visual symbols. Much will depend, too, on individual differences of representative power. A mind with a high degree of visualising power will tend habitually to represent words as word-pictures.

The verbal groups or complexes just described are capable of becoming associated in definite series,[1] and it is by the aid of such series that our knowledge of things in their order of time and place is largely built up. The general conditions of the formation of such highly composite series are the same as before. The more closely the several elements (sounds, vocal actions, &c.), have been attended to in their succession, and the more frequently the series has been run over, the firmer the bond of connection.

It follows from what was said just now that in learning a train of words together with its accom-

[1] Strictly speaking a word is a (short) series of sounds, vocal actions, and visual symbols.

panying ideas, all the elements of the complex are not commonly presented. Thus when a child is learning a poem out of a book, and repeats the words audibly, there is the full operation of the different associative agencies (the linking of one visual symbol, of one vocal action, &c., to its successor) at work. On the other hand, in committing to mind what has been said to us, the retention turns principally on the knitting together of the succeeding sounds; and in learning a passage from an author the process of acquisition depends, to some considerable extent at least, on firmly binding together the visual symbols.

Memory and Expectation. Our images and trains of images are commonly accompanied by some more or less distinct reference to the corresponding presentations, and to the time of their occurrence; in other words, by some amount of belief in the corresponding events. In some cases, no doubt, this accompaniment is of the vaguest kind. In a state of listless reverie we may have a series of images without any distinct reference to the corresponding experiences. We simply picture the objects, without reflecting where or when we have seen them or shall see them. In other cases, however, we distinctly refer the images to some place in the time-order of our experience. This reference assumes one of two well-marked forms: *(a)* a reference to the past or Memory, or more fully Memory of Events, and *(b)* a reference to the future or Expectation.[1]

[1] It were to be wished that there were some word to mark off this fuller process of memory from the mere revival of images. Some German psychologists, as Drobisch and Volkmann, would distinguish the former as Recol-

Both memory and expectation involve a series of images ordered in time, and both illustrate the action of association. Thus in remembering the events of a particular day the mind retraces the (principal) steps of a succession of experiences, the images following in the order of the events, and being 'localised' in this order. Similarly in anticipating the succession of the events of a journey similar to one already performed, the mind passes over a succession of images having the same time-order as the events of which they are copies, and held together by the bond of contiguity.

Again, both memory and expectation are modes of belief; but they are perfectly distinct modes. In memory we have to do with a reality which is over, which is no longer. In general the mind is in a passive attitude with respect to it. The train of memory images may indeed excite faint feelings of regret or longing, but these are momentary only, and the mind resigns itself to the fact that the events are past. When we experience longing or regret in looking back, there seems to be a momentary assimilation of a past to a present moment. By dwelling on the past situation we tend to imagine it as a present one, in which we are able to act, in order to attain some good or avert some evil.

In expectation, on the other hand, the attitude of

lection (Erinnerung), contending that this distinction is supported by long usage. (See Drobisch, *Empirische Psychologie*, § 35; Volkmann, *Lehrbuch der Psychologie*, Vol. I., p. 464.) But this distinction seems hardly borne out by popular speech. Besides, the word Recollection seems best confined to the active side of the reproductive process. There is something to be said for Brown's use of the word remembrance to indicate the process of suggestion supplemented by the time-reference. (*Philosophy of the Human Mind*, Lect. XLI.).

the mind is one of strenuous activity. It stretches forwards in anticipation of the coming event. There is a preparatory fixing of the attention. To expect a thing is to be on the look-out for it, to be ready to apprehend the impression when it occurs, or to have the attention preadjusted. Not only so, it implies a readiness to act in conformity with the occurrence. Thus while memory is a comparatively passive state of mind, expectation is one of tension, effort or strain.

The mental state known as expectation varies according to the number and character of the images called up. Where the anticipation is definite, that is where the actual presentation of the moment calls up one series of images, the active tension is greater. In waiting for a person to begin to recite a familiar poem we eagerly look on and desire to realise the coming sounds. If, on the contrary, the expectation is indefinite, as when we are watching a person who is about to recite some poem, though we know not what, different series of images are called up, more or less distinctly. And in this case the eagerness of mind takes another and more complex form, including an impatient curiosity to know which of the anticipated series it is to be.[1]

Not only so, the state of mind will vary greatly according as the representations are pleasurable or painful. In each case the attention is fixed, only in a different way. In the former case the direction of the attention is more of a voluntary act, and is accompanied by an active desire to realise the anticipated good. In the latter case the attention is bound and fettered, while at the same time there is a shrinking away from, or an impulse to put the evil further off. In extreme cases, as in that of a paralysing terror, this overpowering of the attention may reach to such a pitch that all effort to avoid the evil is precluded. The will cannot detach the attention from the evil, in order to direct it to the means of warding it off.[2]

We thus see that memory and expectation involve a succession of

[1] A state of uncertainty often adds to the eagerness of expectation through a desire to exchange a painful state of doubt for one of rest. We are less impatient when sure of the fruition of some hope, than when there is an element of uncertainty.

[2] The difference of mental state in looking forward to a good and to an evil will be illustrated more fully by and by when we examine into the nature of willing.

images and an accompaniment of belief. It is to be added that there is often the latter adjunct without the appearance of either (definite) memory or expectation. In representing, for example, any recurring conjunction of experiences, as the sequence, the setting of the sun and the appearance of the stars, we do not recall any particular occasion on which this observation was made. Similarly of the relations in space of permanent objects, as the proximity of the Houses of Parliament and Westminster Abbey. There is belief here without a distinct reference to a particular time. Nevertheless, there may be said to be in all such cases a vague reference to the past, though the very fact of the repetition of the experience precludes a definite reference to a particular time. According to some, too, such a belief implies an element of vague anticipation. Not only so, it has been said by certain psychologists that belief, in some degree, always attends the revival of images.[1] The question as to the nature of belief will be considered more fully later on.

Representation of Time. The mental states marked off as memory and expectation plainly involve the representation of time. To recall an event is to refer to a past, to expect one is to refer to a future. Both expectation and memory are developed in close connection with the growth of this representation of time.

It is difficult for us at first to conceive that a child could ever have had a succession of unlike experiences and not instantly referred these to their positions in the time-order as before and after. Yet there is every reason to think that the knowledge of time is a late acquisition. In its developed form the representation of events in their temporal order is attained much later than that of objects in their spatial or local order. The genesis of the former is intimately connected with the process of reproductive imagination, whereas the origin of the latter is connected with that of sense-perception. Children attain very clear ideas about the position of objects in space, the rela-

[1] For example, Dugald Stewart and M. Taine. See the latter's work, *On Intelligence*, Pt. I., Bk. II., Chap. I., Sect. III.

tions of near and far, inside and outside, &c., before they have any definite ideas about the succession and duration of events. Thus a child of three and a-half years, who had a very precise knowledge of the relative situations of the several localities visited in his walks, showed that he had no definite representations answering to the terms 'this week,' 'last week,' and still tended to think of 'yesterday' as an undefined past.

As we saw above, some discrimination of successions of sensations as such, as well as of their durations, is presupposed in the development of the space-perception. To this extent, then, the apprehension of time precedes that of space. But this first representation of time is vague and limited only. Space, or portions of it, can be seen at one moment by the aid of a number of sensations locally discriminated. Time can only be apprehended by the aid of representations *recognised as such.* This is manifest even in the case of that rudimentary apprehension or 'perception' of short periods of time by the sense of hearing described above.[1]

Representation of Succession. The representation of time begins with the recognition of two successive experiences as successive. This, as has already been remarked, is more than the mere fact of succession.[2] It implies an act of reflection upon the succeeding presentations, and a representation of them together, at the same moment, as successive. And this, again,

[1] We may be said directly to apprehend or 'perceive' the present, and to represent the past as that which was once a present, and the future as that which is to be a present. Popularly, we talk of perceiving time when we apprehend short periods of time ending in the present moment. The expression 'perception of time' seems to have reference, further, to the distinction between apprehending time by way of a succession of objective changes, *e.g.*, movements of the hand of the clock, and by way of the individual's own 'subjective' feelings.

[2] See p. 206.

as we saw also, presupposes the persistence of presentations for an appreciable period.[1]

This representation of succession appears to begin by noting the relation of a present actual experience or presentation to some represented experience, immediately preceding, or about to follow. The present moment is the starting point in all representations of time. We cannot imagine or think of time without some present point of view from which we may prospectively represent a future, and retrospectively a past.[2]

How Representation of a Past arises. The simplest form of time-apprehension would seem to arise in the following way. A child is watching some interesting object, say the play of the sunbeam on the wall of his nursery. Suddenly the sun is obscured by a cloud and the marvel of the dancing light vanishes. In place of the golden brilliance there now stands the dull commonplace wall-paper. This cessation, however, as we saw above, does not imply an instantaneous sinking of the presentation below the level of consciousness. The image persists, and attracts the attention by reason of its interestingness. At the same time there is the actual present, the sight of the sunless wall. Here then the contrast between presentation and representation, the actual

[1] See p. 221.

[2] It is curious, here, as in other respects to note the similarities and dissimilarities between the representations of time and space. The space we see is in front of us: with this is contrasted the space behind us which we only represent. On the other hand, space extends away from our standpoint in many directions. Again we cannot picture space, even that behind our backs, except by imagining ourselves facing it, that is, having it in front of us. ?

experience of the present, and the represented experience which is not now, would disclose itself. The antithesis of now, and not-now would be reached.

Not only so, in this persistence of a representation along with a presentation the relation of succession between the corresponding events would be discerned. The representation *a*, and the presentation B, would tend to group themselves in a certain order. Every time the attention was recalled to *a* (by reason of its persistence and interestingness), it would tend (following the direction of its movement in successively fixing the presentations A, B) to be carried on to B. That is to say, *a* would take up its place as an antecedent to B, and the relation of the corresponding presentations A, B, would thus be represented as a transition from A to B, and not conversely. And this apprehension would be aided by the fact that *a* declines in intensity and distinctness, while B, as the actual presentation, persists intact, and so gains in force relatively to *a*. In this way the child's mind would fully seize the fact that A had been displaced by B. The vague representation of a 'not-now' would be developed into the more definite representation of a 'no-longer'.

How Representation of a Future arises. Let us now take the case of anticipation. The representation of a future arises, like that of a past, in connection with an actual present. Here, it is obvious, the previous occurrence of the succession is presupposed. A presentation A cannot call up the representation of its consequent B, unless the two have become associated by one or more past experiences. If the presentation B follows A at once, or as soon as the corresponding image is called up, there is no room for anticipation, or for the representation of a future. But if there is an interval between the calling up of the image and the realisation of it by the occurrence of the actual experience, the representation of a future will arise.

In order to retrace the process, we will imagine the situation of a hungry child who sees all the preparations of his food. Under these circumstances the representation of the pleasurable experience of eating is vividly suggested. Since in this case the image is immediately associated with, and directly called up by, an actual impression it will attain an exceptional degree of intensity and persistence. And the pleasurable character of the representation would still further ensure its persistence. Here again, then, there are all the conditions for noting the contrast of presentation and representation, the realised 'now' and the unrealised 'not-now'.

In this case, however, the relation of representation and presentation would be a different one. During the prolonged existence of the two in mental juxtaposition, the child would discover that every time the actual presentation A rose into distinct consciousness it would be followed by the representation *b*. The presentation and representation would thus assume a different order in this case from that taken up in the first. Through repeated mental transitions from A to *b*, moreover, *b* would gain in force, and not lose, as in the former case. That is to say the relation between presentation and representation would disclose itself in a tendency in the latter to supplant the former, and not *vice versâ*, as in the first case. And on the ground of this relation between A and *b*, the child would ascribe a different order to the actual occurrences. A would be viewed as leading on, and about to give place, to B. In other words *b* would be projected in advance of A as its consequent. Here, then, the vague representation of a 'not-now' will be differentiated into the representation of a 'not-yet'.[1]

Representation of a Time-series. The representation of a number of successions, or of a time-series takes place, in much the same way, in connection with an actual presentation. Suppose a series of events A, B, C, D . . . . . H. Then when the presentation H occurs, the representations *a*, *b*, *c*, *d*, &c., persist in consciousness. These last will, as shown above, be referred to the past. But they will not be referred to the same points in this past. In considering in rapid succession the group of images, the attention is determined to a certain order. It moves easily and smoothly along the series *abc*, &c., but only with difficulty along another order say *cba*, or *cab*. In this case, too, the differences of the intensity of the images due to unequal degrees of subsidence would make themselves felt, and serve as an additional clue to the temporal order of the events.

[1] If, indeed, as is fairly certain, each presentation and resulting representation occupies a certain duration, and goes through a rapid series of changes of rise and decline, it would seem that a consciousness of the decline of the representation and the rise of the presentation in the first case, and of the reverse process in the second, would further serve to suggest the distinction between the 'no-longer' and the 'not-yet'.

Representation of Duration. Somewhat different from the representation of a time-order or a series of events in time is that of duration, or a length or portion of time. Here the conditions of the growth of the representation are not a succession of unlike experiences or changes, but rather the persistence of an (approximately) uniform experience. Further, there seems to be needed an experience which is uninteresting, in order that the attention may be in a manner compelled to direct itself to its aspect of duration.

These conditions appear to be fulfilled in the case of a prolonged expectation. A child, for example, might probably obtain his first distinct idea of a time-length when told to wait for the satisfaction of an expressed wish. In such a situation his attention fixes itself on the representation of the promised gratification. Owing to this state of pre-occupation, the succession of events filling the interval, the other images intruding themselves, are not distinctly attended to. The anticipation is the all-engrossing representation, and so may be said to constitute the content of the interval. Under these circumstances the apprehension of duration becomes distinct as a consciousness of a prolonged present in antithesis to a desired future. Reflection on this prolonged process, this continued anticipation of a pleasure accompanied by a recurring recognition of its non-realisation, leads to an apprehension of a certain length or duration.

Here, again, we have to suppose certain temporal marks or signs by which the extent of time at any particular stage of the waiting would be estimated. That at any two successive stages the mental states somehow differ, is manifest. For the waiting is itself an experience, the representation of which persists. In truth, at any point in this interval of waiting, the mind is aware of so much waiting gone through. The successive acts of forward attention, and the succeeding rebuffs, are vaguely represented, and thus there is a degree of mental fatigue which varies with the duration of the process. It may be added that a distinctly painful experience from which we desire to escape would also supply the conditions of the genesis of this apprehension of duration. A boy 'kept in' by task-work, or undergoing the experience of being 'bored' by a moral disquisition, is in a favourable position for gaining an acquaintance with time.[1]

Higher Form of Time-representation. The perfect representation of time involves a combination of the two kinds of representation just described. Time is for us a succession of events having individually and collectively a certain duration. Just as we only clearly intuit a certain length of space, or distance, when this is marked off or defined by two tangible or visible objects: so the distinct representation of any duration involves that of two defining points, a beginning and an end. And the representation of a time-series is incomplete without that of the time-intervals between the successive members of the series.

The apprehension of the duration of a chain of experiences is developed by aid of the discovery that different successions of events may run on together, or take place in the same time. We do not directly apprehend the duration of a series of events which

[1] In this respect, too, there is a close analogy between the apprehension of space and of time. In each there is something more than the knowledge of discrete points: there is the cognition of a *continuum* in which these points are contained. And in each case this apprehension arises by way of a persistent uninterrupted mental state, in which there are no abrupt changes, but only gradual ones (experience of movement in the one case, that of waiting in the second).

greatly interests us: for in this case attention is fixed on the experiences themselves. It is by finding out that *while* we have been thus interested, another series of events has transpired the duration of which we already know, that we are able to measure the duration of the first experience.

In this way, the 'subjective' and highly variable estimate of time described above is supplemented and corrected by a reference to an 'objective' standard, which answers to a constant (or approximately constant) time-experience of ourselves, and to a common time-experience of ourselves and others. Such a standard of reference seems to be found in movement, and more particularly, visible movement. The movements of the sun, of its shadow on the dial, or of the hands of a clock, supply such a standard of reference. Uniform movement from point to point of space serves to define time-length, inasmuch as the positions successively taken up by the moving body correspond to, and at once suggest points of time. In this way our space intuitions, though presupposing a vague knowledge of time, serve in their turn to perfect the representation of time.[1]

As we have seen, the measurement of time by noting the intervals between a succession of sounds, may be rendered very exact. It is not improbable that in the case of a musician the habitual objective standard of reference may be sound-intervals. It is probable, further, that our own bodily movements supply us with a customary mode of measuring time. It has been found that when we try to reproduce a small time-interval, as that between two strokes of a pendulum, we tend unconsciously to assimilate it to a particular interval (about $\frac{3}{4}$ of a

[1] *Cf.* Herbert Spencer, *Principles of Psychology,* Vol. II., Pt. VI., Ch. XV., p. 267, &c.

second). This answers roughly to the duration of a movement of the leg in rapid walking. And Wundt argues from this fact that the sense of duration has been developed in connection with the most constantly practised movements of the body, which have thus supplied us with our customary unit of time.[1]

Our representation of the past is a fragmentary one only; and what we are wont to call an immediate assurance of a past event is often in part a matter of inference. In going over bygone years we only recall a very few events, and these but indistinctly. Our representation of a continuous past is built up out of representations of successive durations or time-portions, days, weeks, &c. The further off the time recalled, the fewer are the images of events revived, and the more the representation approximates to one of a mere time-length, or an empty portion of time. Thus in recalling a year of early life we represent at most, perhaps, the circumstance of our being at school at the time. For the rest, the reproduction is accompanied by a vague representation of the succession of seasons, which, since they constitute regularly recurring sequences of events, can be inferred to have entered into the year's experience.

The construction of this time-scheme is effected by numerous processes of reviewing or retraversing the prominent members of the series of experiences. This process may be carried on in one of two ways: *(a)* in the forward direction, as when we recall some past event and move onwards towards the present; or *(b)* in the backward direction, as when we return to some remote period of life by way of the intervening stages. This last retrogressive mental movement is, however, always the more difficult.[2]

[1] *Physiol. Psychology*, Vol. II., Cap. XVI., p. 286.

[2] This retrogressive movement from the present to the past is aided by a number of circumstances, *e.g.*, social converse, representations of the time-order in space-symbols, as in lists of years, chronological tables, and all written records of the past.

Much the same line of remark as that followed in dealing with the representation of the past, applies also to the representation of the future. It consists of representations of successions of experiences of certain durations. And the further off the time, the less definite or complete the representation of the contents. At the same time, it is obvious that in this case the representation of the concrete experiences making up the content of the time-scheme must be much more scanty, vague, and variable, than in the case of retrospection.

Localising Events in the Past. After this representation of past time has been developed, the rise in consciousness of any image is at once followed by a more or less elaborate process of projection into the time-series. This implies that we refer it to a point of time in the past, the position of which is estimated with reference first of all to the present, and secondly to some other events the temporal distance or remoteness of which is already known. In many cases this reference is extremely vague and incomplete, as when we remember that we have met a person on some occasion, but cannot recall the date. We here give the event some undefined degree of remoteness from the present, but cannot localise it relatively to other events. Such an imperfect localisation of an event appears to be determined by the degree of distinctness of the image. In other cases we are able to reproduce the relations of the events to other events preceding and succeeding it, and so to assign it a definite position in the time-scheme.[1]

[1] The origin of our idea of time has met with but scant treatment at the hands of English psychologists. Brown has a few good suggestions on the subject (*Lectures on the Philosophy of the Human Mind*, Lect. XLI.); and Reid has a chapter on Duration (*Essays on the Intellectual Powers*, III., Chap. III.). *Cf.* James Mill's *Analysis*, Ch. XIV., Sect. V., and Mr. Spencer's *Principles of Psychology*, II., Pt. VI., Chap. XV.). German psychologists seek to account for the development of anticipation and memory by their theory of

It is only as memory is developed in this distinct and complete form that there arises a clear consciousness of personal identity, that is to say an idea of a permanent self continuing to exist in spite of the numberless changes of its daily experience. Since the consciousness or knowledge of self thus presupposes a considerable development of representative power, it is attained much later than a knowledge of external things.[1]

Association by Similarity. Although the principle of contiguity covers most of the facts of memory, it is usual to lay down other principles of association as well. Of these the most important is Association through Similarity. This principle asserts that an impression (or image) will tend to call up an image of any object previously perceived which resembles it. Thus a new face suggests by resemblance another and familiar one, a word in one language as the Italian *toro*, a word in another as the Latin *taurus*, and so on. The more conspicuous the point of resemblance between two things, and the greater the amount of their resemblance compared with that of their difference, the greater the suggestive force.

This kind of association is strongly marked-off from

the mutual hindrance *(Hemmung)* of representations. See Waitz, *Lehrbuch der Psychologie*, § 52; and Volkmann, *Lehrbuch der Psychologie*, II., Section V., A, p. 12 and following. The above account of our time-representation follows pretty closely their treatment of the subject. A somewhat similar mode of explanation is followed by M. Taine, *On Intelligence*, Pt. II., Book III., Sects. VII. and IX. The writer has dealt with the defects and errors incident to the process of representing time in his work on *Illusions*, Chap. X., p. 239, &c.; *cf.* Chap. XI., p. 302, &c.

[1] The way in which the idea of self is reached will be touched on again later on.

the first. Contiguity associates things which are adjacent in our experience, that is to say events which are contemporaneous or immediately successive in time, and things contiguous in place. Similarity on the other hand brings together experiences widely remote in the time order. Thus a face seen to-day in London may remind us of one seen years ago in a distant part of the globe.

Relation of Similarity to Contiguity. The exact relation between he two laws of Contiguity and Similarity has given rise to much discussion. Some seek to reduce both kinds of association to one. Thus Sir W. Hamilton endeavoured to carry up both laws into the Law of Redintegration.[1] Mr. Spencer follows out this suggestion and aims at reducing contiguity to similarity. That is to say, he holds that the cohering of impressions ('feelings') with previously experienced impressions of the same class is the sole mode of association. When a present impression A calls up the images *a*, *b*, the essential fact is the similarity between A and *a*. That *b* is also recalled is due to the circumstance that it has a similar relation in time or space (or both) to *a*.[2]

On the other hand some would do away with similarity as a distinct mode of association, recognising only contiguity. According to these, when an impression recalls a similar one the process may be symbolised as follows. The present percept *axb* is followed by the image *pxq*, *x* being the element of similarity. The calling up of the *x* element in the group *pxq* is not a case of association at all. The presence of *x* in the new group *axb* lifts the representation *x* in the group *pxq* above the threshold of consciousness.[3] The real process of association is seen in the revival along with this *x* of its accompaniments *p* and *q*. And this is a case of contiguous association.[4]

There is little doubt that the two laws of association are not ulti-

[1] *Lectures on Metaphysics*, Vol. I., XXXI.

[2] See *Principles of Psychology*, Vol. I., Pt. II., Chaps. VII. and VIII., especially § 120.

[3] This revival of an impression by a present similar one, with which the revived element coalesces, is recognised by some psychologists as 'Immediate Reproduction,' while revival by way of contiguous association is called Mediate Reproduction. See Drobisch, *Empirische Psychologie*, § 32, 33 ; Volkmann, *Lehrbuch der Psychologie*, Vol. I., Section IV., A and B.

[4] This is the view taken by Mr. James Ward in the article already referred to. *Cf.* Prof. W. James, *The Association of Ideas*, p. 14.

mately distinct from one another. Each mode of reproduction may be said to involve the co-operation, in different proportions, or with different degrees of distinctness, of two elements, a link of similarity or identity and a link of contiguity. Thus when a person's name calls up the image of his face, it is because the present sound is automatically identified with previously heard sounds.[1] So too revival by similarity commonly involves contiguity as shown above. Sometimes indeed the action of similarity is seen in something like its purity, as when on seeing a person's face we recognise it as familiar, that is distinctly recall a past similar impression, without being able to recover any of its accompaniments. But in ordinary cases what we call revival by similarity involves the calling up of concomitant circumstances. Hence the relation between the two laws may be symbolised as follows:—

$$\text{Contiguity}, \begin{array}{c} A \\ \Big| \\ (a)\text{—}\pi \end{array}; \qquad \text{Similarity}, \begin{array}{c} A \\ \Big| \\ c\text{-}a\text{-}f \end{array}.$$

That is to say, in the first case the process of identification is automatic or slurred over; and the revived concomitants are thought of as quite distinct from that which revives them; whereas in the second case the identification is the important step in the process, and the concomitants are not distinctly separated from the identified element.

Yet while thus recognising the fundamental identity of the two Laws of Association, we may say that the formal distinction between them justifies us in recognising them as two laws. The fact that in the one case, and not in the other, there is that peculiar concomitant known as the consciousness of similarity (amid diversity), with the tinge of emotional excitement appertaining to this, constitutes a real psychological difference. And for practical purposes it is very important to distinguish between the movement of mind from the representation of a fact to that of its adjunct in time, and the mental transition from the representation of one object or event to that of another separated from it in time.

Influence of Law of Similarity. The force of similarity exerts a wide influence on the flow of our representations. When it is impossible by an act

[1] "The reproduction of a presentation (Vorstellung) is called mediate, when it takes place along with, and through another representation either immediately or mediately called up; so that the ultimate ground of the reproduction must always be a perception and an immediate reproduction of a presentation effected through this."—Drobisch, *loc. cit.*, p. 86. *Cf.* Prof. Bain's account of the relation between contiguity and similarity, *Senses and Intellect*, 'Intellect,' Ch. II., § 2.

of reflection to find a link of contiguity connecting an antecedent image and its consequent, the thread of connection can be found in some likeness or analogy. Among these links of similarity must be included what has been called the 'Analogy of feeling'. One thing is apt to remind us of another and disconnected thing by reason of its similar emotional effect. Disparate sensations, as those of colour and of tone, have certain similarities in their emotional accompaniment. Hence the transference of the language proper to one class to another, as when we talk of a 'harsh tone' in a picture, or of the 'rich colouring' of an orchestral accompaniment. We have classical authority for likening a trumpet note to a brilliant scarlet colour. The strange associations formed by some, as the now famous brothers Nussbaumer, between certain sounds and certain colours may be due in part to such an analogy of feeling.[1]

Acquisition is greatly aided by this 'attraction of similars' as it has been called, or the tendency of like to call up like. If everything we had to learn, whether by actual observation or by books, were absolutely new the labour would be colossal. When we study a new language, for example, the similarities very greatly shorten the labour. Thus, when the German word Vogel calls up the familiar name fowl, its meaning is at once fixed. The new acquisition is permanently attached to the pre-existing stock of

[1] For an account of these curious associations of colours and sounds, see G. H. Lewes *Problems of Life and Mind*, Prob. III., Chap. IV. ; F. Galton, *Inquiries into Human Faculty: Colour Association*, p. 145, &c.

acquisitions through a link of similarity. Or as we commonly express it, the new is assimilated to the old.

While the binding force of similarity thus in a measure aids in memory-work, it is apt to interfere with a full and distinct picturing of past events. Every approximation of two images, not connected by contiguity, serves to loosen them from their proper connections of time. A mind strongly impressed by resemblances is liable to become confused in its recollections. Thus by connecting two words, two places, because of their resemblance we are apt to transfer some of the (unlike) features or accompaniments of the one to the other. Not only so, by going on connecting two objects, as two faces, by a link of likeness we are beginning to form a typical image which shall be equally representative of both. And this is a germ of the process of generalising, which belongs to the operations of the Understanding to be considered by and by.

It follows that the 'attraction of similars' may oppose the revival of distinct mental pictures, and to this extent be unfavourable to the development of a good pictorial memory. But if so it subserves the growth of another kind of memory, that which is known as the 'philosophical' or which might perhaps be better called the scientific. It is the binding force of similarity which leads to that grouping or arranging of particular facts which prepares the way for the processes of thought; and, after these have been performed, to the connecting of facts with the principles of which they are the illustrations.

Association by Contrast. In addition to the principle of Similarity another principle of association known as Contrast is commonly laid down. By this is meant that one impression, object or event tends to call up the image of its opposite or contrast. Thus it is said that black suggests white, poverty, wealth, a flat country a mountainous, and so forth.

It is, however, extremely doubtful whether contrast as such constitutes a bond of attraction among representations. On the contrary, it would rather appear that contrast between two representations leads to an opposition and a mutual hindrance. A presentation or a representation tends to exclude its opposite from consciousness.

Suggestion by contrast, so far as it is a fact seems to owe its force mainly to the circumstance that all knowledge of things begins by marking off broad differences or contrasts, such as light and dark, noise and silence, great and small. Not only does the mother or teacher begin to instruct the child by pointing out these contrasts to him, he spontaneously brings one thing into contrast with another, or views it in that relation, as when he says 'This is a hot plate, this is not a cold plate'. This being so it may be said that whenever we perceive any object marked by a prominent quality, such as a tall man, a flat country, a stormy sea, we are vaguely setting it in antithesis to its opposite, namely a short man, a hilly country, a calm sea. The usages of speech confirm this tendency by continually bringing together such opposites as hot—cold, tall—short. And thus the representations of the contrasting objects become more firmly united by a bond of contiguity. It is added by some, *e.g.*, Drobisch and Prof. Bain, that suggestion by contrast illustrates the force of similarity, since two contrasting representations, *e.g.*, hot—cold, tall—short, imply a difference in respect of one and the same quality or aspect (temperature, height).[1]

Contrast plays only a limited part in memory or acquisition. Its chief use is to arouse attention and thereby to stamp deeper on the mind what is unusual, exceptional, and in contrast with the ordinary run of experience, such as the sight of a giant or a dwarf, the roar of Niagara, and so on. In some cases it appears to co-operate with contiguity in bringing about an association between the images of two objects or events. The impression made on the memory by the juxtaposition of barren mountains and fertile valleys, by the combination of a high-sounding name and a very insignificant-looking person, or by the succession of a prosperous and an adverse reign in English history, illustrates the

[1] Drobisch adds that in all cases of suggestion by contrast the suggestive force resides in the likeness, and not in the contrast. Thus when a drawing of a group of laughing faces reminds us of another of a group of weeping faces previously seen, the revival "takes place manifestly only through the similarity of the faces in their juxtaposition" (*Empirische Psychologie*, § 32, p. 85).

effect of contrast in confirming a contiguous association.[1]

Complex Association. So far it has been assumed that association is simple, that one and the same image only enters into a single associative combination. But this does not correspond with the facts. Association is highly complex. One element may enter as a member into a number of distinct combinations. Thus the image of the Colisseum at Rome is associated with that of events in my personal history, of pleasant days passed at Rome, of historical events, such as the gladiatorial combats of the Empire, its conquests and luxury, &c. The threads of association are not distinct and parallel, like the strings of a harp, but intersect one another, forming an intricate network.

Convergent Associations. One result of this complexity is that different threads of association converge in the same point; so that the recall of an image may take place by a number of suggesting forces. This co-operation of associative forces is involved in the composite trains of images described above. The process may be very well illustrated by the case of a succession of words.

A verbal series committed to memory consists, as we have seen, of series of auditory, vocal, and visual representations; and this composite series is supplemented by a series of object-images. The whole series is thus a highly intricate sort of cord in which a number of threads are intertwined. Hence in re-

[1] For an historical account of the different views held as to the Laws of Association, see Hamilton's *Lectures on Metaphysics*, Vol. II., Lect. XXXI.

calling a series of words, as those of a poem, the mind may travel along any one of the parallel series of images. Thus it may move now along that of the sounds, now along that of the visual signs, and now along the picture-series corresponding to the objects described and events narrated. It follows that if the members of one series are not firmly knit together, the mind can pass by one of the other series.

Not only so, supposing that the elements of each word-complex are closely attached to one another, the mind on finding the path along any one series interrupted, may pass over to another path and return to the first path beyond the gap by a circuitous route. Thus a child in reciting a poem from memory may at some point fail to recall the auditory and vocal link of the complex chain, but by recalling the associated images or ideas, or the look of the page out of which the poem was taken, he may be able to move on to the next member of one of these series, and so return at the next stage to the series in which he is specially interested at the time. In this way the several threads of association strengthen one another.

Associations of Numbers. The advantage to memory of such parallel and connected threads of association seems to be shown in the fact that many young persons visualise numerals in certain number-forms, or geometric schemes, more or less elaborate, and in some cases highly coloured as well.[1] The explanation seems to be as follows. The learning of numbers illustrates the associating of a series of sound-representations with a series of visual images. In the case of the lower numbers the sound tends to call up a concrete image of the number, *e.g.*, the arrangement of the dots on a domino or card. But in the case of the higher numbers no such image is possible. Here all that is

[1] Nearly one in four of the Charterhouse boys was found thus to visualise numbers in some form.

called up (in the way of a concrete object) by the number-sound is the visual symbol (as 100, 1000, &c.). Thus the association of the double series of auditory and visual symbols is the main process in learning numbers. What the child requires, indeed, in manipulating numbers, whether working out a sum on a slate, or mentally calculating, is a clear representation of these visual symbols.

Now, in order to bind together the series of visual symbols, it would be enough to link together the successive sounds, provided that the proper visual symbols were firmly attached to these. But children's memories being weak, they find it an advantage to retain the visual series independently. It is probable indeed that owing to the general superiority of visual to auditory reproduction, it would in most cases be much easier to commit to mind a series of sounds by aid of a firmly associated series of visual impressions, than to acquire the latter series by the aid of the former. This independent visual reproduction is effected by giving the images of the symbols a local arrangement, and grouping them according to a design. By so doing, they can recall the separate numerals and their place in the series by recalling the design as a whole. In this way their minds are able to move from number to number not only by one route, that of the successive sounds, but by a second route, that of the local arrangement of the number-symbols.[1]

This co-operation of associations is seen in another form in those cases where one and the same image is attached to a number of quite disconnected images or series of images. In this case the mind may return to a particular point by a number of paths, not running side by side as in the case of composite trains, but starting from widely remote points.

In most of our acquisitions there is this form of combination of associative forces. Thus the date of an historical event is associated with that of simul-

[1] For an account of these number-forms, see F. Galton, *Inquiries into Human Faculty*, p. 114, &c. These forms vary greatly in different cases, and suggest that accidents of individual experience serve in part to determine the precise arrangement. But the recurrence of the same peculiarities of form, *e.g.*, a sudden change of direction of the numerical line at 10, seems to show that common causes have co-operated as well (*e.g.*, the feeling of an analogy between the marked change of the numeral form and number sound at 10, and a sudden change of direction in lines).

taneous events at home or abroad, and of preceding and succeeding events. And it may be recalled by way of any one of these channels. These combinations include associations by similarity as well as by contiguity. A person's name may be recalled not only by recalling his appearance, the book of which he is the author, and so on, but also by hearing another name which resembles it. The succession of Saxon kings is aided by the similarity of their names. So the learning of the verses of a poem is aided by the similarities of metre and rhyme.

Divergent Associations. While looked at from one point of view the fact of the complexity of association is an aid to memory, looked at from another, it is an obstruction. If an image is associated with a number of other and disconnected images, then the mind in setting out from this image may move along any one of a divergent series of paths. Accordingly it is less likely to strike upon any one particular path that is required at the moment. It is like being in a town and having to find one's way out in a particular direction, instead of being outside and having to find the way into it. The multiplicity of paths which was an advantage in the one case, is a hindrance in the other. The errors of confusion to which we are liable in repeating a poem, or playing a tune from memory, are due to the fact that certain members of the series enter into other associations, and so lead us astray. This aspect of association has been marked off as *Obstructive Association.*

Passive and Active Memory: Recollection. The reproduction of presentations is a passive or mechanical operation. It is independent of the will and controlled by its own laws. When there is perfect retention, the flow of images goes on automatically without the least intervention of the active mind. In many of our idle moments, as in taking a walk in the country, we thus give ourselves up to the unimpeded flow of images.

In this passive process of reproduction, the particular sequence followed at any time will be the resultant of all the forces of revival acting at the time. The actual impressions of the moment, or recent events, will constitute the starting points. These will call up images of other objects and events associated with them, according to the degree of firmness of the associative bonds and the strength of the general tendency of the images to recur.[1] The continual incursion of new and disconnected impressions, which start new trains of images, as well as the co-operation of similarity with contiguity, and the frequent calling off of the mind from one train by divergent paths, will serve to give to such a purely passive flow of images the appearance of a disorderly chaotic succession.

In contrast to this passive reproduction there is an active reproduction in which the will co-operates. Here the succession of images is still ultimately determined by the laws of association. The will cannot secure a revival of any impression except by

[1] It follows from our exposition of the laws of the revival of images, that every revival is the resultant of two forces: *(a)* the disposition of the image to recur which depends on the whole number of repetitions of this impression (whatever its accompaniments), and which is greatly strengthened by recency of impression; and *(b)* the degree of cohesion between the image and the antecedent which excites it.

the aid of these laws. That is to say, a person cannot recall a thing by directly willing it. All that he can do is to put himself in the mental attitude suitable to remembering it. But this ability to look out for, and aid in the revival of, an image, tends greatly to modify the passive flow of images described above. Hence we say that the process of reproduction though an automatic process is susceptible of being controlled by the will. This active side of memory is best marked off as Recollection.[1]

Attention and Recollection. In order to understand this co-operation of the will in the processes of reproduction, we will first examine the case in which its activity is present in a marked degree, viz., in the process known as 'trying to remember' a thing. The will works here as in the case of all other intellectual operations, through the attention. To try to remember is to concentrate the mind on the operation, to shut out disturbing influences. The very bodily expression of the attitude, the fixed look, compressed lips, and so on, shows that there is a special effort of concentration.

The effect of this effort of attention is to give greater distinctness and persistence to what is before the mind. Thus if a child is asked the date of a certain battle he may by an act of attention give clearness and fullness to the representation of the battle. And by so doing he helps to give effect to the associative force connecting the event and the date. Not only so, the will accomplishes an

[1] Sir W. Hamilton, following Latin writers, gives to it the name Reminiscence.

important work in resisting obstructive associations, turning away from all misleading suggestions, and following out the clues. The revival of an impression, as of a name, or an event, is a gradual process. We are often dimly aware beforehand of the character of the image we desire to call up clearly. And so we know well enough whether we are on our way to it, or not. (See Maudsley, *Phys. of Mind*, pp. 519, 520.)

It is obvious that this process of trying to remember a definite fact shows deficient memory, absence of perfect associative 'cohesion'. And at best it can but poorly compensate for the want of a firm mental connection. Yet its value is not to be under-estimated. In the case of the most tenacious memory there must be many loose associations which need the co-operation of attention. It may be added that even where trying to recollect seems futile, it may effect something. The sudden return of a name after many efforts to recollect it, points to the conclusion that the revival of the image had been in a measure furthered by these acts of concentration.

Commanding the Store of Images. It is, however, not in this form of severe effort to aid in the revival of some particular image, that the co-operation of the will is chiefly important. It enters, in a less marked manner, into all our ordinary processes of revival. Even in repeating a familiar poem the will, by an effort so slight that we are scarcely aware of it, steadies the whole operation, securing the due succession of the several members of the train, and the avoidance of misleading suggestions.[1]

[1] Even in the "passive" revivals described above there commonly enters a semi-conscious process of selection. See Mr. S. Hodgson's *Space and Time*, p. 267, &c.

This ability to control the reproductive processes reaches its highest development in a habit of going over the contents of memory, and following out, now one path now another, according to the purpose in hand. Thus when a poet needs a simile, or a scientific teacher an illustration of some kind, he is able to inspect the store of his accumulations in so far as it bears on the purpose in hand. This ready command of images by the will presupposes that there has been an orderly arrangement of the materials, that when new acquisitions were made, these were linked on (by contiguity and similarity) to old acquisitions. It is only when there has been the full co-operation of the will in this earlier or acquisitive stage that there will be a ready command of the materials gained in the later stage of reproduction.

Degrees of Recollection: Forgetfulness. Our ability to recall impressions varies indefinitely from total inability up to the point at which all sense of effort vanishes and the reproduction is certain and instantaneous. At one extreme we have total forgetfulness or oblivescence; at the other, perfect recollection and perfect knowledge as determined by retentiveness.

Perfect recollection at any time embraces but a very few of the impressions recalled by the mind. The conditions of such facile recall are too complex to allow of its realisation in the large majority of cases. Interest, repetition, association with what is near at hand, and so offers a starting point in the process of recovery, are all necessary to this result. What we can recollect instantly, and without mental exertion is either included in, or firmly attached to, our permanent surroundings, dominant interests, and habitual pursuits. Thus we can at any time recall without effort the scenery of our homes, or place of business, the sound of our friends' voices, the knowledge we habitually revert to and apply in our daily actions, our profession, amusements, &c.

Next to this perfect recollection comes that which involves a greater effort and is less uniform and certain. This applies to a good many of our acquisitions which have been firmly built up at the outset, but to which we have had little occasion to go back of late. Our knowledge of many striking events of the more remote past, much of our school knowledge, as that of classics or mathematics, not turned to practical account in later life, is an illustration of such imperfect recollection. We can only recall it by a prolonged effort, and by the help of special circumstances, *e.g.*, talking with some old acquaintance, steeping our minds for awhile in a Latin or Greek author.

Partial Oblivescence. Here, it is obvious, we reach the first stage of Forgetfulness or Oblivesence. There is partial or temporary oblivesence, yet not total forgetfulness. The mind has evidently retained, but an exceptional strength of reviving or resuscitative force is needed to call up the image. This temporary forgetfulness may be momentary only, and due to the condition of the brain and mind at the instant, as fatigue, emotional agitation, 'absence of mind' or preoccupation. Or the inability to recall may extend over a longer period. For instance, our difficulty in speaking a foreign language which we learnt some years ago and have not recently had any occasion to make use of, may require for its removal a day or two's sojourn in the country.

Such partial or temporary forgetfulness suggests that at any time the sense-impressions and related thoughts which interest us and occupy our attention serve to crowd out the images and ideas which are not of present interest. The field of distinct consciousness has a very limited area, and there is a continual opposition between different and disconnected masses or aggregates of impressions and images, each tending to expel or crowd out the other from the region of clear consciousness. This antagonism and rivalry between different mental aggregates shows itself very plainly in the tendency of presentations and representations to exclude one another, and more particularly of the former to exclude the latter. Illustrations of this exclusion will occur to the reader at once. The sensations of light and sound which greet the mind on waking at once extrude the but recently vivid images of sleep. On the other hand, when the senses are at rest, as when we sit and muse in a quiet room in the evening twilight, the force of images preponderates, and these attain a great intensity. In like manner one group of representations may by its persistence effectually exclude another. In this way we account for the banishment of earlier acquisitions by later, and the resurgence of the former when the pressure of the latter is removed, *e.g.*, in old age.

Total Oblivescence. The final stage of perfect oblivescence is reached when no effort of will, and no available aid from suggestive forces succeeds in effecting the reproduction. This holds good of the large majority of our impressions. After a short interval they fade into complete oblivion. Reproduction in their case is practically impossible.

Whether we are to regard impressions thus beyond the reach of recollection as absolutely obliterated, is a question of some difficulty. It may be said that we can never be sure that reproduction is impossible. Very exceptional circumstances, such as intense mental exaltation, or the recurrence of certain sensations (*e.g.*, those of odour which often show so powerful a reviving force) might suffice to effect a recall. This line of remark, however, would seem to apply only to impressions which have at some remote time been graven on the mind by the forces of interest and repetition. But, as already remarked, the vast majority of our sense-experiences do not thus stamp themselves on the mind. And it seems unmeaning to say that such impressions have any protracted mental existence.[1]

Divisions of Memory. Although we speak of memory as if it were a simple indivisible faculty, we must bear in mind that it is really made up of a number of distinct parts, as the retention of sights, sounds, and so forth. It is one thing to recall a musical sound or a series of such sounds, another to recall a group of visible objects. There are as many compartments of memory as there are kinds of impression. Thus there is a memory for visual impressions, and another for auditory impressions. Within the limits of one and the same sense, too, there are distinct differences of memory. Thus the memory for colours is different from the memory for forms, the memory for musical sounds, from the memory for articulate sounds. In addition to these retentions of passive impressions there are retentions of active experiences, as our various manual movements and our vocal actions.

That the memory of one order of impressions is distinct from that of another is fully emphasised by Volkmann, who says: "There are as many species of memory as there are species of representations. . . . *a* memory is everywhere: *the* memory nowhere".[2] This truth is seen, quite apart from the individual differences to be touched on presently,

[1] An unexpected capability of recalling apparently forgotten impressions shows itself in certain morbid conditions. Injuries to particular portions of the brain appear sometimes to effect an exceptional revival of images, see Taine, *on Intelligence* Pt. I., Bk. II., Chap., II., V. It may be added that Sir W. Hamilton, by the aid of his peculiar theory that all mental activity must persist, argues that a total obliteration of impressions is impossible. There is always retention, though there is not reproduction, see *Lectures on Metaphysics*, XXX.

[2] *Lehrbuch der Psychologie*, Vol. I., § 83, pp. 463, 464; *cf.*, G. H. Lewes, *Problems of Life and Mind*, Third Series, Prob. II., Chap. IX., pp. 119, 120.

in the facts of disease. Lesions in certain portions of the brain may bring about the loss of a limited group of acquisitions, e.g., the knowledge of a particular language.[1]

Speaking generally, and disregarding for the present individual differences, we may say that the higher the sense in point of discriminative refinement the better the corresponding memory. We appear to recall sights best of all; then sounds, touches, tastes and smells. Further, since the muscular sense is characterised by a high degree of refinement, the retention of our active experiences is in general relatively good. It must be remembered, too, that our muscular experiences are uniformly attended with passive impressions, and that these serve materially to support the retention. Thus the mechanic recalls his manual performances partly by representing the visual appearance of the moving hands; similarly the orator recalls a string of vocal utterances by help of the images of the sounds which immediately follow them.[2]

Remembering Things and Remembering Words. Of all impressions visual percepts are the most important. As has been shown above, visual perceptions, gathering up as they do the results of our sense-experience as a whole, make up the chief part of sense-knowledge. And since sight is the most discriminative of the senses we find that visual percepts are better recalled than any others. Visual images or pictures of objects thus constitute the staple of our ordinary re-

[1] See Dr. Carpenter, *Mental Physiology*, Book II., Chap. X., p. 443, &c.; and T. Ribot, *Les maladies de la Mémoire*, Chap. III.

[2] On the different degrees of revivability of our several orders of sensations; see Herbert Spencer, *Principles of Psychology* Vol. I., Pt. II., Chap. V.

callings. In representing a particular object, as the interior of a room, Westminster Abbey, John Smith, and so on, we picture its visible aspect, and represent other qualities (even though the most interesting, as the taste of an orange) only vaguely in the background. To remember a thing is thus pre-eminently to recall its look or visible aspect.[1]

Next to visual images come those of words. Owing to the importance of verbal signs pointed out just now, representations of these constitute a large fraction of our mental reproductions. So close, indeed, is the association between words and things that we rarely represent an object without at the same time more or less distinctly reproducing its name. Not only so, the retention and reproduction of all the higher products of intellectual activity, general notions, judgments, and trains of reasoning, is effected by way of language.

To remember a name, however, is not necessarily to remember the corresponding object (or idea). We may distinctly recall the name of a particular place or person, and yet possess only a very vague and indistinct representation of the visible object denoted. In order to preserve distinct images in connection with words, it is necessary first of all to have deep impressions, or clear percepts of the objects, and secondly to associate these closely with the corresponding names.

At first sight there might seem a contradiction between the assertion that we can often retain impressions of words and not those of the cor-

[1] This superiority of visual retentiveness is seen in the fact that most of us tend to connect together even the comparatively revivable impressions of hearing by the aid of series of visual images (see above p. 274).

responding objects, and the statement previously made that words are symbols having no interest in themselves but only in relation to their significates. But in reality there is no contradiction here. Words are originally of no interest apart from things: but there are powerful forces tending to alter this natural relation. As we shall see by and by, the very function of words as general signs renders them extremely liable to be divorced from the objects for which they stand. Not only so, as social beings we are, to a considerable extent, more immediately concerned with the mastering or storing up of words, *e.g.*, in acquiring knowledge when young, in studying the art of conversation, &c.[1]

Growth of the Reproductive Faculty: Beginnings of Memory. Memory presupposes Sensation and Perception. Images do not appear till sense-knowledge has reached a certain stage of development. Retentiveness in the early period exists only as the power of recognising objects when they are present. A child less than 3 months old will remember the face of his nurse or father for some weeks. The first images only appear later as the result of many accumulating traces of percepts. They are such as are immediately called up by the actual impression of the moment. The interesting experiences of the meal, the bath, and the walk are the first to be distinctly represented. As the interest in things extends and the observing powers grow, distinct mental pictures of objects are formed. M. Perez tells us of a child of 8 months who had been accustomed to watch a bird singing in a cage, and who on seeing the cage without the bird showed all the signs of bitter disappointment.[2]

Repetition of Experience. As experiences repeat themselves and traces accumulate, representations be-

[1] The tendency of the mind to content itself with words which have but little content or meaning, will be more fully illustrated by and by.

[2] *Les trois premières années de l'enfant*, p. 122.

come more distinct, and are more firmly associated; also the number of representations and of associative links increases. The learning of the meaning of words, which, as is well known, may precede the actual employment of them by several months, greatly enlarges the range of suggestion. After this the mother or the nurse is able to call up the image of absent objects, such as persons or animals, by talking of them. The repetition of conjunctions of experience further brings about whole groups and series of representations. The child's mind is able to pass not only from the actual impression of the moment to the image of something immediately accompanying it, but from this last to another image, and so on. Thus a child of 18 months will mentally rehearse a series of experiences, as those of a walk: "Go tata, see geegee, bow-wow," &c.

New Experiences. The child's experience is not a mere series of repetitions. There is a continual widening of the range of presentations, an addition of new experiences. This extension of the area of impression is due in part to the expansion of his interest in things, and in part to the changes in his environment. In this way fresh materials are being stored up in the memory. To some extent these displace the old. The temporary impressions of last week are dislodged by the temporary impressions of this week. But the growth of memory means an increase in retentive capacity. The progress of the child is marked by the fact that the new displaces the old less and less, that there is a gradual enlargement of the store of permanent acquisitions.

How Memory improves. This process of growth, this continual increase in the store of acquisitions, implies an improvement in the power of seizing and retaining new impressions. By this is meant that any particular acquisitive task will become easier, and that more difficult feats of retention will become possible.

The progress of retentive and reproductive power may be viewed under three aspects. First of all impressions will be acquired or stored up more easily (for a given time). Less concentration is needed for the stamping in of an impression. Or to put it otherwise, a given amount of concentration will lead to a storing up of more material, that is, more complex groups of impressions. This may be called increased facility in acquisition. Secondly, impressions are retained longer. A given amount of effort in the acquisitive stage will result in a more enduring or permanent retention. This aspect may be marked off as an increase in the tenacity of memory. Thirdly, this progress implies a more perfect form of revival. That is to say impressions will be recalled more readily and in a higher degree of distinctness and fidelity than formerly. The details of the mental image will be fuller, and the whole image or group of images better separated from other like images or groups.[1]

The three characteristics of a good memory here touched on are not wholly independent one of another. The memory may develop under one aspect and not to the same extent under the other. Thus there may be a growth of acquisitive skill in the shape of a quickness of mind in seizing new impressions and retaining them for a short time. This, however, would only amount to an improvement of temporary reten-

[1] Progress may be measured under each of these three aspects. The first two lend themselves best to exact measurement (see above, p. 34).

tion. Similarly there may be an improvement of tenacity without any commensurate increase in readiness of reproduction. Different individuals show these aspects of memory in very unequal degrees.[1]

Causes of Growth of Memory: Plastic Power of Brain. This increase in retentive power is due to some considerable extent to the spontaneous unfolding of the brain powers. All mental acquisition appears to involve certain formations or structural changes in the brain. The capability of the brain of undergoing these changes, or what has been called its plastic power, increases rapidly during the early part of life. Impressions of all sorts stamp themselves more deeply on the mind of a child ten years old than on that of a child three or four years old, owing to this greater plasticity of the brain. This condition explains the precocity of memory. It is commonly said that the power of storing up new impressions reaches its maximum in early youth and the fact is undoubtedly connected with the physiological fact that later on the structure of the brain is more set, or less modifiable.

Just as memory is one of the first faculties to be developed, so it is one of the first to be impaired by age. The loss of the power to build up new acquisitions, as the names of new acquaintances, marks the proximity of the culminative point of mental development. The decline of memory, like its development, shews well marked stages.

[1] On the essentials of a good memory, see D. Stewart, *Elements of the Philosophy of the Human Mind*, Pt. I., Chap. VI. Drobisch recognises four characteristics of a good or 'strong' memory: (1) Facility of apprehension or acquisition; (2) Trustworthiness, or fidelity of conservation and reproduction; (3) Lastingness or permanence; and (4) Serviceableness, *i.e.*, readiness of recollection, *Empirische Psychologie*, § 35. Locke points out that the two main defects of memory are oblivion, *i.e.*, (want of tenacity) and slowness (want of readiness in reproduction), *Essay on the Human Understanding*, Bk. II., Chap. X., Sect. 8.

The weakest associations (*e.g.*, between proper names and their objects) corresponding to the lowest stage of nervous organisation, are the first to give way. The same order of decline is seen in mental disease. Thus in disorders involving loss of memory for words, those classes of words which answer to the lowest degree of cohesion or nervous co-ordination disappear first.[1]

Improvement of Memory by Exercise. Yet allowing its full weight to this fact we can easily see that a large part of the improvement of memory is due to exercise. The successive changes in the plastic power of the brain assign limits to acquisition: but the actual amount of retention reached is determined (within these limits) by the amount of exercise.

New Acquisition aided by Old. In one sense all acquisition renders further acquisition easier by offering more points of attachment. A student of 25, well versed in languages, will master a new language in much less time than a boy of 12 or 15, even though the plastic power of his brain is less. All fresh acquisition, in so far as it is assimilating new to old material, is assisted by the results of past acquisition. In this sense exercise improves memory, and enables it to go on developing long after the plastic age has been past.[2]

Habits of Memory. Not only so, memory is

[1] For an account of the physical changes involved in the decline of memory with old age, see Dr. Carpenter, *Mental Physiology*, Book II., Chap. X., § 351. The order of failure of words in mental disease (aphasia) is said by M. Ribot to be from the particular to the general. Thus proper names are lost before common, substantives before adjectives. This corresponds, according to M. Ribot, with the range of the uses of these classes of words, and so with the degree of co-ordination involved. See his work, *Les Maladies de la Mémoire*, Chap. III., p. 132, &c.

[2] It follows that there is a reciprocal benefit in linking on new to old knowledge. The new is attached to what is already in our grasp, and this last, by being revived in connection with the new acquisition, is kept fresh.

strengthened by exercise in a narrower and stricter sense. Increase of facility in acquiring and reproducing new knowledge is aided by the formation of intellectual habits. By these are meant close concentration of mind on the subject-matter learnt, searching out and noting all its points of attachment to previously acquired impressions or facts, repetition or going over the new impression, and finally concentration of mind at the moment of recall. The more perfect these habits, the higher will be the capacity for seizing and retaining new knowledge.

Varieties of Memory, General and Special. There is probably no power which varies more among individuals than memory. The interval which separates a person of average memory from one of the historical examples, as Joseph Scaliger or Pascal, seems enormous.[1] There is every reason to think that some excel others in their power of memory as a whole, by which is meant their capability of retaining and reproducing impressions generally.[2]

More commonly, however, the observed differences appear in some special direction, or with respect to some particular class of impressions. Thus one person has a good retentive power for visual or auditory

[1] Casaubon says of Scaliger—"He read nothing (and what did he not read?) which he did not forthwith remember". Pascal says he never forgot anything which he had read or thought. For other examples of capacious memory, see D. Stewart, *Elements of the Philosophy of the Human Mind*, Pt. I., Chap. VI., § 3; and Sir W. Hamilton, *Lectures on Metaphysics*, Vol. II., Lect. XXXI.

[2] As Volkmann points out in the passage just referred to, this 'general memory' has reference to an average ability of reproduction in respect of different orders of impressions or images. The reader should compare the distinction between general and special retention, with that drawn above between general and special discrimination (see p. 145).

impressions as a whole; or for those of some variety of these, as impressions of colour, or of musical sound; or, finally, for a circumscribed group of objects, as faces. In this way arise what are known as the pictorial memory, the musical memory, the local memory, &c. As illustrations of such exceptional retentive power in particular directions, may be mentioned Horace Vernet and Gustave Doré who could paint a portrait from memory, Mozart who wrote down the *Miserere* of the Sistine Chapel after hearing it twice, Menétrier who could repeat three hundred disconnected words after once hearing them.[1]

Even differences in general power of memory probably turn to a considerable extent on special differences, namely in verbal retention. Although, as we have seen, to recall words is not the same as to recall things, the latter operation cannot be carried on to any considerable extent apart from the former. Hence a good memory for impressions generally has in all cases been largely sustained by an exceptional verbal memory.[2]

The differences of memory among individuals are numerous, and by no means easy to classify. To begin with more general points of inequality, persons may differ from one another with respect to the relative degrees of prominence of the aspects of memory distinguished above. For instance, some boys are quick in acquisition but not tenacious: they can carry impressions for a short time, but not for a long period. Others again are tenacious but not correspondingly ready to call forth and apply what they know. Again, if we look to more special differences, we find that minds vary not only with respect to the particular impressions which are best recalled, but also with respect to

[1] For other instances, see Taine, *On Intelligence*, Pt. I., Bk. II., Chap. I.

[2] This is amply illustrated in the historical instances given by Hamilton, as well as by the well-known case of Macaulay.

the particular mode of grouping which is most successful. Thus some appear to connect visible objects locally better than others; whereas these last may have a better power of linking together successive pictures answering to events. The former would have a better local, pictorial, or geographical memory, the latter a better historical memory.[1] Closely connected with these differences are those due to the habitual way of committing things to memory, or arranging acquisitions in the mind. We have already touched on the fact that some minds tend to connect things with their adjuncts of time and place, whereas others order or arrange facts according to their relations of similarity, cause and effect, &c. In the same way different minds adopt different habits of 'memorising' verbal material. Hence the threefold division of memory emphasised by Kant: *(a)* the Mechanical memory, which is satisfied with linking together the words (auditory or visual symbols) in series; *(b)* the Ingenious memory which calls in the aid of series of pictures somehow resembling the series of sounds, visual symbols, or the ideas signified; and *(c)* the Judicious memory, in which the understanding takes part, and the logical relations of the ideas are made the connecting bond.[2]

Causes of Difference. These differences are plainly due either to native inequalities or to differences in the kind and amount of exercise undergone in the course of the past life. There are probably native differences of retentive power generally. One child is from the first capable of retaining impressions of all kinds more easily than another. Such inequalities are no doubt connected with differences in

[1] This difference would affect the retention of scientific facts, such as the coexistences (in place) of physiography, astronomy, &c., and the successions in time of the action of forces as dealt with by mechanics.

[2] See Drobisch, *Empirische Psychologie*, § 36. As an example of ingenious memorising he gives the following: we remember the date of Charlemagne's death, 814, by regarding the first cipher as an hour glass, the symbol of death, the second as a spear, the symbol of war, and the third as a plough, the symbol of peace. D. Stewart has some good remarks about the distinction between a 'Systematical' or 'Philosophical' memory, which connects things according to their deeper resemblances, their relations of cause and effect, &c., and the Casual Memory which links them together only by their more superficial resemblances, and their accidental juxtapositions in time and place, *Op. cit.*, Chap. VI., Sect. 2.

the degree of structural perfection of the organs as a whole including the brain.[1] There are also special differences to start with, which are connected with the varying degrees of perfection of particular sense-organs. Thus a child with a good natural ear for musical sounds would be likely to retain these impressions better than another child wanting this sense-endowment. And this for a double reason: (1) because such a superiority would imply a finer discriminative capacity in respect of sound (and retentiveness varies roughly with the degree of discrimination); and (2) because this natural superiority commonly carries with it a special interest in the impressions concerned. A child with a good ear for musical sounds will in general take special pleasure in noting their peculiarities.

On the other hand, these differences are due in part to the differences of circumstances, exercise, and education. While each individual has in his amount of 'natural retentiveness' or degree of 'brain plasticity' limits set to his memory as a whole, much may be done to improve the memory within these limits by exercise. Speaking roughly we may say that the educated have as a rule a better memory than the uneducated.

It is, however, in the improvement of memory in special directions that the effects of exercise are most conspicuous. The habitual direction of the mind to any class of impressions strengthens the retentive

[1] Prof. Bain emphasises this degree of natural retentiveness or plastic power of the brain as setting limits to each individual's memory as a whole. See *Mind and Body*, Chap. V., p. 93, &c.

power in respect of these. Each mind thus becomes specially retentive in the direction in which its ruling interest lies, and its attention is habitually turned. Thus every special employment, as that of engineer, linguist, or musician, tends to produce a corresponding special retentiveness of memory.

It is to be added that the growth of general and of special memory are in a measure connected. While everybody's retentive power is limited, while a special development of memory in one direction precludes an equal development in others, the exercise and improvement of the memory in one direction tends to a certain extent to the strengthening of the memory as a whole. For the growth of memory takes place by the formation of certain habits (concentration, repetition, arrangement of materials); and these habits will stand a person in good stead when he goes on to commit new kinds of material to memory.

Training of the Memory. The training of the memory, though it is not the whole of intellectual education, is certainly an important portion of it. "Tantum scimus quantum memoriâ tenemus." To know a thing implies the remembrance of it.[1] Only when the memory is well stored with distinct images and series of such images, can the higher operations of the understanding be carried out. As Kant observes, "The understanding has as its chief auxiliary the faculty of reproduction".[2]

The culture of a child's memory may be said to begin with the use of language by the nurse and mother in naming to him the various objects of sight. The systematic training of the memory

[1] This is implied in the use of such forms as the Latin *novi* and the German *Ich habe ihn kennen gelernt.*

[2] *Ueber Pædagogik,* p. 492 (Werke Edn. Hartenstein). The relation of a good memory to intellectual power as a whole is discussed by both Stewart and Hamilton in the works referred to.

should be first carried out in close connection with observation. The meaning of words should be taught by connecting them with the real objects, that is to say, by simultaneously naming and pointing out an object. And as supplementary to this, the child should be exercised in recalling by means of words the impressions directly received from external objects.

After a sufficient store of first hand knowledge has thus been accumulated, the memory should be trained in the acquisition of knowledge about things at second hand, that is to say through the medium of verbal (oral and literary) communication. The early period of school life is commonly said to be the most favourable one for the building up of such verbal acquisitions. It costs less effort in this early stage of development to learn the concrete facts of history, geography, or language, than it would cost at a later date. Hence it has been called the 'plastic period'.[1]

Two Branches of Mnemonic Training. The training of the memory by the Teacher falls into two parts: *(a)* the calling forth of the pupil's power of acquisition, or storing up knowledge: *(b)* the practising him in recalling what he has learnt. In respect of each part a judicious and effective training will proceed by recognising the natural conditions of retention, and the particular stage of development reached.

Exercise in Acquisition. In this stage the first rule to be attended to is to take the child at his best. Committing anything to memory is a severe demand on the brain energies, and should so far as possible be relegated to the hours of greatest vigour and freshness. Then everything must be done to arouse the *attention* by making the matter as interesting as possible. The teacher should aim at exciting a pleasurable state of mind at the time in connection with the object of acquisition. Sometimes a painful experience may have to be resorted to. A boy who has made a ridiculous error in history, *e.g.*, by confounding Sir Thomas More and the poet Tom Moore, and been well laughed at, is little likely afterwards to forget the difference. Further, the subject learnt must be put before the mind again and again, so that there be a sufficient deepening of the impression.

[1] Professor Bain regards the period of maximum plasticity as extending from about the 6th to the 10th year. *(Science of Education*, p. 186.)

The writing out of a lesson is a familiar aid in fixing in the mind a piece of new knowledge. And the child should be encouraged to dwell on the subject committed to memory, and to go back to it, so that the full force of *repetition* may be realised. Lastly, the teacher must be careful to point out the relations between one part and another of the subject-matter, and between this as a whole and previously acquired knowledge. In this way the binding forces of *association* will be brought into play. Thus in narrating an event in history, as the Norman Conquest, the several incidents with their relations of dependence should be pointed out, and the points of similarity and of contrast between this and other invasions (those of the Romans, and Saxons) set in a clear light.[1]

Learning by Rote. Hardly anything requires to be said perhaps at this time of day on the necessity of learning things and not simply words. The cardinal doctrine of the modern theory of education is that all knowledge has to do with real objects, and that language is simply the medium by which such knowledge is conveyed, and by which it can be recalled. The insistence on the adequate exercise of the senses and the powers of observation points clearly to the idea that knowledge has to do with sensible realities. As has been already pointed out, cultivation of the memory should at first to a considerable extent proceed hand in hand with the exercise of observation. Not only so, when the age is reached for acquiring large additions of second-hand knowledge, or book-lore, it is of the highest consequence that the realities underlying the words should be distinctly *realised* by means of clear and vivid representations.[2] It is only when the facts of history, geography, and the images of poetry are fully grasped by the mind that the subjects can be said to be truly learnt.

Art of Mnemonics. In ancient times great importance was attached to certain devices for aiding memory and shortening its work, which devices were called Mnemonics. This idea of relieving

[1] The connecting of events in their relations of dependence, &c., clearly involves an appeal to the higher faculties of Understanding and Reason. To explain a thing is one way of fixing it in the memory.

[2] How such representations are to be formed will be explained in the following chapter.

memory was connected with the exploded theory that the main business of learning is to commit words to memory.[1] When this theory obtained, learning was necessarily a dry occupation, and the pupil's mind was wearied by excessive tasks in verbal acquisition. Hence the eagerness to find devices for shortening the toil. Now that this theory is abandoned less importance is attached to a mnemonic art. The inventions of rhyme, alliteration, and so on, obviously help the mind to retain a series of rules. But when things are taught only in so far as they can be understood, it is held that the relations between the facts, or the ideas learnt, should form the main basis of acquisition. In other words, the more things are connected in their natural relations, the less will be the task imposed on the verbal memory.[2]

Although there are no definite rules for aiding the memory which are valid in all cases, there is such a thing as a skilful management of the memory. This will include the formation of habits, not only of concentration and repetition, but of selecting and grouping or arranging. Memory-labour is greatly economised by detecting what is important and overlooking what is unimportant; and children should be exercised in such selection. It is furthered too by finding appropriate 'pegs' on which to hang new acquisitions.[3] Here individual differences must be studied. Some children will remember ideas better by the aid of visual pictures, others better by series of sound-representations. The young are wont to help themselves out of the difficulty of retaining what is difficult, *e.g.*, letters, numbers, dates, by the aid of visual forms (geometrical schemes, and so on). And teachers would do well to find out these spontaneous tendencies

[1] We are apt to treat this theory too contemptuously, perhaps, by forgetting that when the written records of knowledge was less easily accessible, the verbal memory was a matter of much greater consequence than it is now.

[2] For a fuller inquiry into the value of mnemonics see James Mill's *Analysis of the Human Mind*, pp. 324, 5; Dugald Stewart's *Elements of the Philosophy of the Human Mind*, Chap. VI., § VII.

[3] Among these pegs must be reckoned the places in which information can be found. To associate book-knowledge with particular books, and places in these, other kinds of knowledge with particular persons (experts), is a great saving of memory-labour.

of children's minds and to aid them in the process of economising intellectual labour.[1]

Exercise in Recalling. The mere act of taking in new facts and truths is not enough. The teacher aims, or should aim, at keeping fresh and clear in the pupil's mind what is learnt, or in other words, at rendering the memory quick and accurate in reproducing what has been learnt. This result can only be secured by renewed exercises in reproduction. Here again it is important to seize the right moment. To recollect is to concentrate the mind on itself, to 'reflect,' as we commonly say, and implies a higher effort of attention than external observation. In this way a habit of going back on what has been learnt may be gradually induced.

A considerable element in the art of teaching is skill in putting questions to children so as to exercise their power of recalling and reproducing what they have learnt. It is only by frequent going back that the meaning or content of verbal knowledge is preserved fresh. In order to test the knowledge of things, the teacher must call on the pupil to give out what he has learnt in his own words. By such skilful questioning he will find out how far the learner has seized and retained the distinctive features of the subject-matter attended to, so as to keep his mental images clear and distinct. Not only so, by this same practice of questioning the manifold ramifications and connections of each piece of knowledge are more clearly brought into view. It is impossible to point out all, or even most of these at the moment of acquisition: they can only be found out gradually by repeated processes of reproduction.[2]

[1] Compare what was said above (p. 292) on the different modes of memorising. Kant thought lightly of the 'ingenious' memory, as involving an unnecessary loading of the mind. But this is to overlook the fact pointed out in dealing with the co-operation of associations, that the addition of a new series of elements often lightens the labour, provided first that the new series can be better retained than the other which it is the special object to retain, and secondly that it is firmly attached (by the force of analogy or otherwise) to this series. The importance of noting individual peculiarities with a view to determine the most advantageous medium of reproduction in any given case is well brought out by Dr. Mortimer Granville in his little work, *Secret of a Good Memory.*

[2] The importance of exercises in reproduction in training the memory is well illustrated by Mr. Laudon in his volume, *School Management*, Chap. IV..

Subjects which Exercise the Memory. All branches of study exercise the memory in some measure. The student of the higher mathematics remembers the principles and the demonstrations of his science, and this largely by the aid of language or other visual symbols. But when we talk of a subject exercising the memory we mean more (or less) than this. We refer to those subjects which have to do mainly with the particular, and the concrete, and which appeal but little to the understanding. Such subjects are Natural Science, in its simpler or descriptive phase, Geography, History, Language, and the lighter departments of Literature. Arithmetic, though now recognised as a subject which necessarily calls forth the child's powers of generalising and reasoning, also makes a heavy demand on the verbal memory.

Training of Memory but a part of Education. It cannot too clearly be borne in mind that to acquire any amount of knowledge respecting the particular and concrete is not to be educated. Perfect knowledge implies the taking up of the particular or concrete into the general, the connecting of a variety of particulars under a universal principle. It follows that memory may be over-stimulated. A certain knowledge of the concrete, a certain store of images, is undoubtedly necessary to the exercise of the higher intellectual faculties: but if the teacher aims simply at mass or volume of details the higher powers of the mind will be unexercised. Such a course would involve *growth*, or bare increase in the bulk of mind, but not *development.*

The danger of over-stimulating the memory is all the greater owing to the great natural inequalities among children. It may be necessary that every child should have a certain minimum of knowledge in subjects like geography and history; but it is neither necessary nor desirable that a child with a poor retentiveness for languages should be made to study a number of foreign tongues. To judge in a given case how much time and energy should be given to pure memory work is one of the nicest problems in the art of Education.

p. 75, &c. The two branches of memory-exercise here distinguished should of course be carried on together. Linking on new knowledge to old is at once an exercise in acquisition and in reproduction.

APPENDIX.

The reader who has the time may follow Prof. Bain through his detailed illustrations of the Law of Contiguity (*Senses and Intellect* or *Compendium*). An interesting account of Memory, its varieties and the means of improving it, may be found in Dugald Stewart's *Philosophy of the Human Mind*, Part I., Ch. VI. With this may be compared Sir W. Hamilton's account of Memory, *Lectures on Metaphysics*, especially Lectures XXXI. and XXXII.; also Mr. Shadworth Hodgson's *Time and Space*, Part I., Chap. V. The German reader may with advantage consult Volkmann, *Lehrbuch der Psychologie*, I., 4es Hauptstück; Wundt, *Physiol. Psychologie*, II., 17es Cap.; and J. Huber, *Ueber das Gedächtniss.*

On the practical side the reader will do well to consult Locke, *Some Thoughts on Education*, especially § 176; Miss Edgeworth, *Essays on Practical Education*, Vol. II., Chap. XXI.; Mdme. Necker, *L'Education*, Livre VI., Chap. VII.; J. G. Fitch, *Lectures on Teaching*, Chap. V.; Beneke (*Erzieh. und Unterrichtslehre*, Vol. I., §§ 20-22) and Waitz (*Allgem. Pædagogik*, 2nd Part, 3rd Sect.). There are some good remarks on the cultivation of Memory in Kant's Essay, *Ueber Pædagogik*.

CHAPTER VIII.

CONSTRUCTIVE IMAGINATION.

Reproductive and Constructive Imagination. Memory is the picturing of objects and events in what are called images, and is thus a form of imagination. In memory, however, the images are supposed to be exact copies of past impressions. In other words imagination is here reproductive. But what is popularly known as imagination implies more than this. When we imagine an unfamiliar coming event, or a place which is described to us, we are going beyond our past personal experience. The images of memory are being in some way modified, transformed, and recombined. Hence this process is marked off as Productive or Constructive Imagination.[1] And the results of the process may be spoken of as secondary or derivative images, in contradistinction to the primary or radical images of memory.

It is to be observed, however, that what we call reproductive imagination commonly involves a passive or unconscious transformation. We rarely recall a series of events exactly as they occurred. When events are remote the mental images left by them undergo various changes, some members of the group being dropped out, others modified, and so

[1] Since this Constructive Imagination answers roughly to the popular term Imagination, we may for convenience' sake employ the latter for the former.

forth. This passive process will be considered again presently. It follows that there is no sharp boundary between reproductive and productive imagination.

Modes of Imaginative Activity. Imagination works in different ways altering or modifying the products of retention. Thus it transforms by omitting certain elements. The mind pictures an object as a house or tree apart from its usual local surroundings, or leaps over a number of links in a chain of events. We can imagine an object reduced in size, or wanting one of its features. In addition to this isolating activity of imagination, there is the combining. By this is meant connecting parts of different wholes, whether juxtapositions in space or sequences in time, in new combinations. Thus the mind of the child adds new features to an object, or pictures its size greatly enlarged, and interposes new incidents in a series of events. And by this double process of separating and adding, imagination weaves together portions of unlike experiences into new combinations. This is the perfect form of imaginative activity commonly known as Construction.[1]

What Imagination includes. We may see at once from this definition that imagination is much wider than poetic imagination or phantasy, that is to say the picturing of the unreal. It stands in an intimate relation to knowledge. In anticipating what is

[1] According to the older theory, there were three kinds of imaginative activity, the abstracting, the determining, and the combining. By the first was meant the isolating activity described in the text. By the second was signified the supplementary process of filling out the results of abstracting imagination; as in first picturing the sun as a wheel, then as a chariot, &c. By the third process was meant the combining of elements taken from different wholes. See Volkmann, *op. cit.*, Vol. I., pp. 470, 471.

going to happen from moment to moment, in picturing the aspects of new objects before actual inspection, the child's imagination is ever coming into play. Still more widely is it exercised in learning about things from others. Every time he listens to his mother's narratives and descriptions he is working up the images supplied by his own past observation into new forms. To learn is thus to employ the imagination as well as the memory. Further, imagination is concerned in interpreting the signs of others' thoughts and feelings. To 'read' the mind of another is to represent a new mental state by aid of the memory of our own past states. Finally, construction, which is the essential thing in imagination, enters into action, in the discovery and mastering of new combinations of actions. In this form it is known as Invention. Every new sentence which the child utters, every new manual movement which he executes, takes place by bringing together in a new form representations of actions previously performed.

Imaginative Construction as Passive and as Active. The images of memory tend, as has been remarked, to become transformed by a passive, unconscious, or automatic process. Successive presentations of the same object with different adjuncts would lead to the formation of secondary images in which elements of different primary images would be combined. And the revival of images by the force of similarity would conduce still further to such coalescence of different primary images. Finally, simultaneous revival of previously disconnected images might suffice to effect such an amalgamation. This is illustrated both in dreams and in waking fancy where combinations appear to the mind suddenly and independently of any conscious exertion on its part. The sports of childish imagination are not the product of any mental effort, but seem rather to be the result of such a "fortuitous concourse of (imaginative) atoms". Any kind of mental excitement by greatly increasing the number of images called up, as well as their degree of vividness, is favourable to this free uncontrolled play of imagination.

But the more important kind of combination is carried on consciously by an act of mental concentration and an exertion of will. There is a gradual progress towards some desired result, a building up by a deliberate effort of mind of the complex product. Thus, to take the best marked instance of imaginative activity, the poet goes to work in a systematic manner to fashion an image of some scene, gradually reaching the perfect shape which satisfies him. It is this orderly regulated process of construction which is of most account in relation to knowledge.[1]

There is a germ of this active process in what is commonly called reproduction. An intelligent person cannot describe a place which he has just visited, or an incident which he has witnessed without performing a rudimentary process of constructing or re-arranging. As Volkmann remarks, it is only among the uneducated that a strictly faithful reproduction of impressions is found. A common man describes an incident with all its attendant circumstances however unimportant.

[1] The contrast between *passive* and *active* imagination appears to correspond to one aspect of the ill-defined and much-discussed distinction between Fancy and Imagination. Thus Wordsworth remarks of the former: "Fancy depends upon the rapidity and profusion with which she scatters her thoughts and images" (Preface to Poems, p. xxxvi.). Stewart emphasises the prominence of the active element in Imagination (*Elements of the Philosophy of the Human Mind*, Pt. I., Ch. V., § 1).

On the other hand a cultivated mind 'unconsciously' omits, selects and regroups.[1]

Analysis of Constructive Process. (1) *Reproduction of Images.*—This process of construction may be said roughly to fall into two stages. Of these the first is the revival of primary images, or images of memory, according to the laws of association. Thus the poet in imagining scenes and events of his ideal world sets out by recalling the facts of his experience, the images of which serve as the elements out of which the new image-structure is to be built up.

It follows that the excellence of the constructive process is limited by the strength of the reproductive faculty. Unless memory restore the impressions of our past experience we cannot picture a new scene, or a new event. Thus unless a child recalls, with some measure of distinctness, one or more of the blocks of ice which he has actually seen, he cannot imagine an iceberg, or a glacier. The same applies to practical construction or invention. The elementary movements must first be mastered and retained before there can be the process of building up new combinations.

(2) *Elaboration of New Images.*—The images of memory being thus recalled by the forces of suggestion or association, they are worked up as materials into a new imaginative product. This is the formative or constructive act or process proper. The process resembles that of building a new physical structure out of old materials. Certain of these are rejected, others

[1] See Volkmann, *Lehrbuch der Psychologie*, Vol. I., Section IV. D, § 84, p. 469.

are selected and held before the mind. Some materials are available after a process of lopping off or breaking up. Finally the approved materials are joined together into a new whole.

This active process is controlled by a representation of the result aimed at, and a sense or judgment as to what is fitting for the purpose in hand. And it is on the quality of this guiding sense that the excellence of the constructive process mainly depends. According as a poet, for example, has a clear and discriminating, or a dull and obtuse, sense of what is aesthetically valuable, congruous, harmonious, &c., his constructive work will be well or ill performed.

This guiding sense must be distinguished from the desire for an end, though they are closely related. A man may have a keen desire to compass some result, *e.g.*, a mechanical improvement, but no corresponding sense of what is fitting to bring it about. Hence the strength of the desire, though an important factor in the process of construction, is less important than the sense of fitness. The strength of the desire secures the success of the operation by giving clearness and steadiness to this guiding sense of fitness.

The result aimed at and the corresponding guiding sense of fitness, will differ in different cases. In reading a book of travels or a poem we seek to frame clear mental pictures which fit in with the rest of the series. We know when we have hit on the right combination of images in this case by the feeling that we *understand* what we read. Again in combining movements in order to bring about a wished-for practical end, we are guided by the representation of this end. The child combining words in order to express a want, knows he has succeeded when his want is understood and relieved.

The process of construction here briefly described is commonly more intricate than has been assumed. In many cases the stages seem to be as follows: A desire for some end or result, say some mechanical appliance to reduce the cost of producing a commodity, arises in the mind. This calls up numerous representations associated with the purpose, images of appliances resorted to in similar cases, &c. By a merely passive process, these coalesce to some extent, supplying an indistinct mental scheme or framework; and this constitutes the first prevision of what is wanted. This bare outline is, then, gradually filled in and developed by the processes of separation, selection, and combining named above. That there is present, from an early stage of the process, in the obscure background of the mind an image-scheme serving as a model or pattern, seems to be shown by the fact that when the right combination is hit upon it is instantly recognised as the right one.[1]

Receptive and Creative Imagination. The constructive act assumes one of two unlike forms which it is a matter of some practical importance to distinguish. Sometimes the direction of the activity is determined by definite external suggestion. Thus in reading a poem and forming a mental picture of the object described the mind of the reader is tied down to the particular combination originated by the poet and expressed by a particular order of words. This may be called receptive imagination, and is a comparatively simple operation.[2] The imagination of the poet, on the other hand, which created the combination had no such framework

[1] "In the case of none of these active imaginative creations is the whole composed, in the manner of a mosaic, out of its parts, but the whole stands first in consciousness: it constitutes the idea of the work of art, the conception, often flashing on the mind lightening-like, of an intellectual creation." Wundt, *Physiol. Psychologie*, II., Cap. XVII., § 4, pp. 322, 323. The reader should compare this process of the gradual development of an indistinct model-image into a distinct and perfect shape with that of calling up by active recollection an image of memory indistinctly present in the mind.

[2] There is something analogous to this in the perception of material objects, as when we look at the inaccessible clouds and imaginatively represent the corresponding tactual experiences.

within which to confine its activity. The act of construction in this case is of a higher order, involving more complex processes of reproduction, rejection, and selection, and directed solely by an internal sense of what is beautiful or harmonious. Hence we commonly mark this off as original imagination. In the region of practical construction, again, the same difference is illustrated in imitative movements, such as those of drill exercises, and free inventions, where the child hits out new combinations of movement for himself.

Limits to Imagination. All imaginative activity is limited by experience. To begin with, it is confined to breaking up or separating and recombining experiences. There is no such thing as a perfectly new creation. The greatest imaginative genius could not picture a perfectly new colour. Again the processes of separation and combination are limited. When two things have always been conjoined in our experience it is impossible to picture them apart. Thus we cannot picture the surface of an object having no colour (including under 'colour' black, white, and gray).

The more uniformly two things are conjoined, the more difficult is it to separate them. Thus it is much easier to picture a moving object, as a man, apart from local surroundings than a stationary one, as a church. On the other hand the mind finds it difficult to combine images as new wholes when experience suggests that the elements to be combined are incompatible. The Oriental king could not picture solid water or ice. We all find it hard to imagine persons on the other side of the globe with their feet towards ours, and yet not falling downwards. Just in proportion to the uniformity or invariability of our experience is the difficulty of breaking up and regrouping its several parts. Hence the reason why we so easily imagine objects greatly increased in size, as a giant, or greatly altered in colour, as a gold mountain: for in respect of apparent magnitude and colour our experience is highly variable.

The reader must be careful to distinguish between the difficulty or impossibility of picturing objects, and that of understanding how they could be as we picture them. The ambiguous word 'conceive,' as J. S. Mill pointed out, covers both meanings. We can picture the most grotesque combinations, as Atlas carrying the earth, or a human figure poised in the air, but we cannot conceive the corresponding combinations of objects as possible. So far as the capability of merely picturing is concerned, the freaks of fancy of the young and of all of us in passive conditions of reverie and dreaming would suggest that the only limits to such pictorial combination are the incompatibilities of space and time. We cannot of course picture two objects in the same place at one moment: but our dream fancy does almost everything short of this.[1]

Various Forms of Construction. It has been remarked that the essential process in imagination enters into a variety of mental operations. These may be grouped under three heads: (1) Construction as subserving knowledge about things; (2) Practical construction as aiding in the acquisition of knowledge how to do things, or to adapt means to ends; and (3) Construction as satisfying the emotions. The first may be called the Cognitive Imagination; the

[1] While the imagination thus transcends the powers of Understanding, we shall see in the next chapter that these last may, in another respect, greatly transcend the limits of imaginative activity.

second, the Practical Imagination or Invention; and the third, the Æsthetic or Poetic Imagination.

(A) **Cognitive Imagination.** It must be evident that the expansion of knowledge beyond the bounds of personal experience and observation involves imaginative activity. This is seen alike in the *acquisition* of new knowledge from others respecting things, places, and events, and also in the independent *discovery* of new facts by anticipation. The first illustrates the receptive, the second, the creative kind of imaginative activity.

Imagination and Acquisition. The process of recalling, selecting, and regrouping the traces of personal experience is illustrated in every case of acquisition. What is ordinarily called 'learning,' whether by oral communication or by books, is not simply an exercise of memory; it involves an exercise of the imagination as well. In order that the meaning of the words heard or read may be *realised*, it is necessary to frame clear and distinct pictures of the objects described or the events narrated. Thus in following a description of a desert the child begins with familiar experiences called up by the words 'plain,' 'sand,' and so on. By modifying the images thus reproduced by memory he gradually builds up the required new image.

It may be noted that here as elsewhere knowledge consists in discriminating and assimilating. The child has to assimilate what is told him in so far as it is like his past observations, and at the same time to note how the new scene differs from the old ones. The formation of a distinct and accurate image will greatly depend on the degree of perfection attained in this part of the process. In following a description children are apt to import too much into their mental picture, and take up the adjuncts of the images and ideas corresponding to the words. That is to say, the process of selection is incomplete.

On the success of this imaginative effort what is known as the *understanding* of the description will depend. If, for example, the mind of a child, in following a description of an iceberg, pictures a mass of ice, but does not distinctly represent its magnitude, he will not understand the dangers arising to ships from those floating masses. Here we see the close relation between clear imagination and clear thinking, a relation to be spoken of again by and by.

Imagination and Scientific Acquisition. The activity of imagination enters not only into the study of subjects like geography and history, which have to do in the main with concrete objects and events, but to some extent also into the study of Science. Science has to do with the general. Yet before the mind can seize the general it must have clear images of concrete examples. These must of course be based as far as possible on *perception;* but this cannot be the case always. The movements of the planets, the circulation of the blood, are things which we are called on to a large extent to imagine by aid of analogies with objects of perception. Even the objects and processes which escape the observation of the senses, as the vibrations of light and heat, the conjunctions and disjunctions of atoms and molecules in chemical changes, have in a way to be pictured by the mind, and so the understanding of these may be said to exercise the imagination.[1] Only when clear pictures of the particulars are first formed can the subsequent operations of generalisation and reasoning be well carried out.

Reducing the Abstract to the Concrete. This kind of imaginative work, so far from being easy, is exceedingly difficult. It must be remembered that language is in its nature general and abstract. Hence all verbal description involves a gradual process of qualification or individualisation. That is to say, the general name has to be supplemented by a number of qualifying terms, each of which helps to mark off the individual thing better. Thus the historian depicts a particular king or statesman by progressively enumerating his several physical and mental qualities. Now each of these qualifications, again, is in itself nothing but an abstraction. Thus the terms 'tall,' 'handsome,' and so on, applied to a person are abstract terms, and each applicable to a number of persons. The process of realising the description turns on the *combination* of these into a concrete object. The scientific description of a new animal or plant by means of a highly technical terminology illustrates the difficulties of this process of 'concreting the abstract' in a yet more marked manner. And a still greater strain is imposed by the description of the 'extra-sensible' world of atoms and molecules, with their intricate interactions. To 'visualise' or see with the internal eye what is thus

[1] That is, pictured up to a certain point by the aid of analogous sense-experiences, though, as we shall see later on, there can in this case be no perfect imagination of the objects thought about.

described implies a considerable exertion of the imaginative power.

Imagination and Discovery. The discovery of new knowledge is largely a matter of careful observation and patient reasoning from ascertained facts and truths. Yet the scientific imagination materially assists in the process. The inquiring, searching mind is always passing beyond the known to the unknown in the form of conjecturings which cannot be reduced to a process of conscious reasoning. The power of thus divining unobserved facts is known as imaginative insight into things. The child shows this capability when picturing to himself the make of his toys, the way in which plants nourish themselves and grow, and so on.

Not only does imagination thus reach out in anticipation of unobserved facts, it is busy devising hypotheses for the explanation of them. A scientific hypothesis when fully developed assumes the form of a general truth. But it is reached by the help of a process of constructive imagination. That is to say, the mind pictures to itself the action of the forces at work by aid of past observations. Thus the undulatory movements of sound and light were at first 'visualised' by the help of certain visible undulations, as for example those of the sea.

Imagination has thus a close connection with scientific curiosity. Each reacts on the other. The desire to know stimulates the imagination to frame pictures of unexplored realities; and the activity of imagination, leading to conjectural prevision, quickens the desire to investigate in order to verify the conjecture.

It is true that imagination, if not controlled by a critical spirit, may take the place of patient investigation. But when duly restrained by judgment it is a great aid to investigation.

Imagination of Untried Experiences. Our knowledge has to do not simply with the outer world, but with the inner world of feeling and thought. And this knowledge, too, implies, in addition to memory, a process of imaginative construction. Our knowledge of ourselves consists not merely in recalling what we have actually felt and done but in representing how we should feel, think and act in new circumstances. In anticipating the future we are continually representing to ourselves the effects of new surroundings on our emotional susceptibilities and our active inclinations.[1]

(B) **Practical Contrivance.**[2] A process of construction enters into practical acquisition, learning how to do things, as talk, dress, write, draw, and so forth. The child's movements are being continually modified, separated and recombined in conformity with new circumstances and new needs. He is by nature endowed with plentiful active energy, and this of itself leads continually to new tentatives, new experiments. A good part of the child's mental energy thus finds its natural vent in the direction of practical imagination.

Imitative Construction. Much of this new motor

[1] The imagination of others' experiences, their feelings and doings, illustrates the same process. This will be shown more fully when we come to deal with sympathy.

[2] Although the exercise of constructive activity in practical invention is related to the growth of will, there is some convenience in anticipating and treating it here along with imaginative construction in the narrow sense.

acquisition is guided by others' actions. The impulse of imitation leads a child to attempt all sorts of action which he sees others perform. This is seen plainly enough in his play, which is largely a mimicry of the serious actions of adults. This is the receptive side of practical imagination. The exercises of the school, such as singing and writing, illustrate the same process. The simpler actions of the voice or of the hand which are already mastered are combined in more complex operations under the guidance of an external model.

Such combinations are rarely hit on precisely at once. The child's first attempts at vocal imitation are often wide of the mark.[1] The same applies to the manual actions involved in drawing, or writing. In many cases, moreover, the new combination implies a separation of movements previously associated, and such separation adds to the difficulty of the operation. Thus we may observe that the child in building up new vocal combinations is apt to be clogged by irrelevant associations. Hence it is only by repeated trial and gradual approximation that the required combination is effected. Progress in such acquisition depends on his previous command of the muscles in simpler movements, and on concentration of mind and perseverance.

Original Construction: Invention. While new practical acquirements are thus learnt by imitation and instruction, they are also being gained by individual

[1] This is by no means always the case. Indeed, one is often surprised at the readiness of a young child endowed with a good ear and a good articulation in giving back a new grouping of sounds.

origination and invention. Children find out many new combinations of movement for themselves. Their strong active impulses find a satisfaction in manual and other experiments. The pleasure of doing a thing, of overcoming difficulty, is an ample reward for many an effort in practical construction. Such activity is, moreover, closely connected with the impulse of curiosity, the desire to find out about things, their structure and less obvious qualities. In this way practical invention assists in the discovery of facts and truths. A considerable part of the knowledge of things is thus gained *experimentally*, that is to say by means of actively separating, dividing, combining, and otherwise manipulating objects.

(c) **Æsthetic Imagination.** Æsthetic or Poetic Imagination is not subservient to the pursuit of knowledge, whether knowledge about things or knowledge how to attain results. It aims at immediate enjoyment. This applies alike to the receptive and to the creative side of the process. The child listening to a story, or inventing a story for himself, is in each case impelled by the desire for the enjoyment which the images afford. It is this mode of constructive activity which answers to the popular conception of imagination.

Imagination and Feeling. Æsthetic Imagination is thus distinguished by the presence of feeling or emotion. This gives a peculiar vividness to imagination, and also directs it in certain channels which answer to the feeling. Any feeling may thus stimulate the activity of imagination. Thus when fear is excited in the mind the imagination is swayed and bent in the direction of what answers to the feeling, that is to say, the terrible and horrible. The pleasurable emotions, such as love, the emotion of power, the sentiment of beauty, are wont to indulge themselves, or seek a certain mode of satisfaction or gratification through the activity of imagination. Thus the mother dwells on the future of her child: the boy dreams of great achievements: the poet shapes forms which thrill the mind with wonder and yield the pure delight of beauty. In this way the mind adds what are called 'ideal,' to its real satisfactions. The mother by dwelling in fancy on the possibilities of the future, gains a measure of the same enjoyment which the actual realisation of her wishes would bring. The imaginary scenes and actions of poetry afford something of the same delight which the actual perception of such objects would supply.

All imaginative activity, in so far as it is impelled by some motive involves an element of feeling. Thus in working out some conjecture the mind of a lawyer or of a scientific man is stimulated by curiosity or the love of knowledge. In such cases, however, the feeling is present in the highly intellectualised form of a calm motive to action. It is only when discovery is near that anything like an element of emotional excitement presents itself. In the case of what is here called poetic, that is feeling-impelled, imagination, the emotional state is present in a palpable degree throughout the operation, and it supplies a force distinct from that of will, properly so-called. This is seen plainly enough, in the case of painful feelings, such as terror, the influence of which in keeping certain images before the mind is distinctly anti-voluntary. And even in the case of pleasurable feelings, such as the emotion of beauty, the presence of the emotional excitement affects the character of the whole mental process. The end in this case being simply the furtherance and deepening of a feeling already excited in a measure, the whole operation of selection and grouping appears to be immediately determined or controlled by the feeling, with only the slightest admixture of the volitional element, that is to say, a conscious aiming at a result.[1]

[1] This properly emotive control of the imaginative process is well illustrated in our dreams. See my volume, *Illusions*, Chap. VII., p. 164, &c.

Transcending the Real. We have seen that imagination is able (within certain limits) to vary or transform the actual events of our experience. Under the stimulus of an emotion, such as the feeling for the beautiful, or the sublime, imagination is wont to rise above the ordinary level of experience and to picture objects, circumstances, and events surpassing those of every day life. The ideal creations of the imagination are thus apt to transcend the region of sober fact. Hence the realm of romance and fairyland.

Imagination opposed to Intellect. The indulgence in these pleasures of imagination is legitimate within certain bounds. But it is attended with dangers, moral and intellectual. A young person whose mind dwells long on the wonders of romance may grow discontented with actual life. Or he learns to find his satisfaction in such ideal indulgence; and so by the habitual severance of emotion and volition, ceases to feel the presence of every day motives, a result illustrated by the history of Coleridge and other 'dreamers'. This constitutes the moral danger. The intellectual danger is that by an excessive activity of imagination the regions of fact and fiction may become confused. All vivid imagination appears, as was suggested above, to be attended with a measure of belief. Children of very lively imagination easily drift into the belief that their dream-images and their waking fancies answer to realities.

Intellectual Value of Imagination. We have now seen that the imagination stands in a double relation to intellection or knowing. On the one hand, when controlled by the will and directed to the ends of truth it is an important ancillary in the acquisition and discovery of knowledge. On the other hand, when uncontrolled, or when subjected to the powerful sway of emotion, it easily opposes the progress of knowledge.

Writers on the imagination have been wont to dwell rather on this second aspect, and to overlook the function of the imagination in thinking and understanding. The old opposition of imagination and understanding rested on an inadequate apprehension of its operations. No doubt imagination and thought are broadly contrasted, since the former has to do with the concrete in its fulness of detail, while the understanding has to do with the general in its bareness and simplicity.[1] Yet there is a connection between the two, which recent psychologists have come to see. When duly controlled imaginative activity prepares the way for the higher processes of thinking. By giving mobility and flexibility to the images of memory it is an essential preliminary to the activity of thought.[2] Thus by breaking up or dissolving complex images and series of images into their parts and allowing of the isolated picturing of objects and events, it facilitates the processes of abstraction (turning the mind from the complexities of individual things). And by combining mental pictures in new wholes it paves the way for the syn-

[1] The broad contrast between the two has been illustrated in a very interesting way by Mr. Galton. As he justly remarks, "our bookish and wordy education tends to repress this valuable gift of nature". *Inquiries into Human Faculty*, p. 113.

[2] Goethe somewhere talks of the imagination as 'die Vorschule des Denkens".

thetic activity of thought in combining thought-elements (notions) in new relations.[1]

Development of Imagination. Just as memory only begins to develop when the faculty of perception has been exercised up to a certain point, so imagination only distinctly appears when memory has attained a certain stage of perfection. This applies alike to construction as concerned with objects and with actions. The child must be able to recall distinctly a number of previous sense-experiences before he can build up new pictures of what is going to happen, or strike out new combinations of movement.

Germ of Imagination. Although the infant shows the germ of imagination under the form of anticipating what is new, it is not till language is mastered that its activity becomes well marked. It is in listening to the simple narrations and descriptions of the mother or nurse that the power of framing new pictures is first exercised. It is noteworthy that the child will only manifest interest in such narrations after he has been accustomed to a verbal recital of his own personal experiences.[2] The capability of representing a new series of events depends on the exercise of the reproductive imagination in recalling old successions. In this way the child's knowledge of things gradually widens, passing outwards from the

[1] The function of imagination in thinking will be touched on again in the following chapter. Its importance in relation to intellect and thought has been emphasised by Mr. Spencer, *Principles of Psychology*, II., Pt. VIII., Chap. III., §§ 491, 492: by George, *Lehrbuch der Psychologie*, 2nd Pt. 5, p. 278, &c.: Volkmann, *Lehrbuch der Psychologie*, Section IV., D, § 84, p. 469.

[2] See Perez, *Les trois premières années de l'enfant*, p. 163.

narrow circle of his individual observations, and embracing larger and larger regions of space and time.

Children's Fancy: Nature of Play. After a certain amount of exercise of constructive power in this simple receptive form, the child shows a spontaneous disposition to build up fancies on his own account. The feeling of possessing a new power seems to act as a motive here. At first this activity of fancy manifests itself in close connection with the perception of actual objects. This is illustrated in children's play. Play offers as we have seen ample scope for practical ingenuity: it is the natural vent of active impulse, the liking to do things, and to find out new ways of doing them. But it owes its interest to another circumstance, namely that it is a mimicry and kind of make-believe of the actions of adults. When at play the child realises by an exercise of fancy the objects and actions which he is mimicking. The actual presentations supply a basis of fact on which the imagination more easily constructs its fabric.[1] By the alchemy of imagination the doll becomes in a manner transformed into a living child, the rude stick into a horse, and so on. A very rough basis of analogy will suffice for these creations of fancy: hence a boy will derive as much pleasure from a broken and shapeless hobby horse as from the most life-like toy. Play thus illustrates in a striking manner the liveliness of children's fancy. In their spontaneous games they betray the

[1] The aid rendered by the presence of an actual object to the activity of imagination is illustrated in the fact quoted by Mr. Galton, that chess-players can think out a game better when they have the empty chess-board present.

germs of artistic imagination: they are in a sense at once poets and actors.

Children's Fictions. A child of three or four years who has heard a number of stories will display great activity in modelling new ones.[1] These fabrications show the influence of the child's own experience and observation as well as of the narratives of others. At this period original fancy is apt to assume extravagant shapes. A strong susceptibility to the excitement of the marvellous, often supplies the impelling force in these constructions. Young children are wont to project themselves in fancy to distant regions of space and to transform themselves into other objects. Thus a child barely 3 years was accustomed to wish she might live in the water with the fishes, or be a beautiful star in the sky. The daring of these combinations is to a considerable extent accounted for by the child's ignorance of what is impossible and improbable in reality. To the young mind to fly up into the sky is an idea which has nothing absurd about it. The riotous activity of children's fancy is thus due in part to their want of experience and judgment.

Imagination brought under Control. The progress of experience and the growth of knowledge lead to a moderation of childish fancy. From the first spontaneous form in which it is free to follow every capricious impulse, it passes into the more regulated form in

[1] These fanciful creations are often built up on a slender basis of observation. Thus a little girl ($5\frac{3}{4}$ years) once found a stone with a hole in it, and set to work to weave a pretty fairy tale respecting it. To her fancy it became the wonderful stone, having inside it beautiful rooms, and lovely fairies who dance, sing, and live happily.

which it is controlled by an enlightened will. That is to say, its activity becomes directed by the sense of what is true, life-like, and probable. The old nursery stories cease to please. Narratives based on real life, histories of children, their doings and experiences, take their place. In this way the earlier impulses, the love of the marvellous, the liking for the grotesque and ridiculous, are replaced by higher motives, a desire to learn about things, and a regard for what is true to nature and life.

Later Growth of Imagination. Although through the development of the powers of judgment and reasoning the child's fancy becomes restricted, it is a mistake to suppose that it ceases to grow We are apt to attribute to children a high degree of imaginative power just because we are struck by the boldness of their conceits. But when they talk of the sky tumbling down, or of their flying up to a tree, they are in truth exercising imagination in a very rudimentary way. The combinations are very easy ones from their point of view, being simple in structure and modelled on the pattern of familiar everyday facts. The same child that performs these 'feats' could not perhaps form a clear mental picture of an animal or a city that was described to him. The power of imaginative construction goes on developing with the accumulation of elements and the repeated exercise of the faculty

What Improvement in Imagination implies. The progress of imaginative power with the advance of years means first of all increased facility in grouping elements. A piece of imaginative work of the same degree of complexity would be executed in less time and with less effort. Thus the student of botany or zoology would find it easier to realise a description of a plant or animal. In the second place this progress implies an increase in the difficulty of the operations which become possible. By more difficult operations must be understood, either more complex combinations, such as the visualising of a large and intricate scene, say a battle; or combinations more remote from our everyday experience, as the scenery and events of *Paradise Lost*, or the life of primitive races. It need hardly be added that original construction must be taken as indicating higher imaginative power than receptive or imitative construction.

Varieties of Imaginative Power. Different persons differ in power of imagination no less markedly perhaps than in that of memory. These differences may be either general or special. One man has excellent constructive ability generally, which is something distinct from a mere superiority in reproductive power. More commonly, excellence in imaginative capability shows itself in some special direction. Thus we have a good imagination for visible scenery, for musical combinations, for practical expedients, and for others' internal experiences. And as a more circumscribed development we find a specially good imagination for faces, for historical scenes, and so forth.

These differences plainly depend partly on native inequalities and partly on differences in surroundings, the influence of companionship, and special exercise and training. Children differ from the first in their formative power as a whole. Some minds are able to recast the various results of their experience more easily than others. Again there may be a special native bent to one kind of imaginative activity, due to a specially good sense, with its accompanying superior degree of retentiveness. In this way the born painter with his fine eye and his good memory for colour would naturally find it easy to exercise his imagination on this material. The emotional susceptibilities, too, have much to do with fixing the special line of development of the imagination. A naturally strong liking for scientific discovery leads a boy to exercise his imagination in relation to natural phenomena and their laws, whereas a deep feeling for the beautiful aspect of things would impel the imagination to follow the line of poetic combination.

While in this way much of the difference, with respect both to the general and to the special development of imaginative power, is predetermined by natural aptitude and inclination, the influence of surroundings and of education is a considerable one. Systematic training will never make a naturally unimaginative child quick to imagine, but it may materially improve the power, and even raise it to a considerable height in some special direction.

Training of the Imagination. The side of imaginative activity which will chiefly interest us here is the cognitive side. The peculiar position of the faculty in relation to Intellect on one side and Emotion on the other gives rise to problems of peculiar difficulty. As we have seen, the power of picturing what has never been actually seen is of the utmost value for knowledge. And yet this same power if indulged in to excess may give rise to illusions, and so frustrate the purposes of intellect.

Restraining Immoderate Fancy. That imagination requires restraining nobody will doubt. "Nothing is more dangerous to reason than the flight of imagination. . . . Men of bright fancies may in this respect be compared to those angels whom the Scriptures represent as covering their eyes with their wings."[1] In the case of children of very vivid imaginations the treatment of the faculty is often a matter of some difficulty. Wild, disconcerting, and injurious fancies must, it is plain, be dispelled. And the vividness of fancy must not be carried to the point of confusing fiction and reality. In such a case the immediate object of training should be to strengthen concurrently the powers of judging and reasoning as a make-weight against a too lively imagination.

Guiding the Fancy. It seems probable, however, that the perils of indulging children's fancy have been somewhat exaggerated. In the case of healthy children who are kindly treated the exercise of fancy rarely leads to bad moral or intellectual consequences. Children appear to dream vividly, yet as a rule they soon distinguish between their dreams and their real waking experiences. A strong native bent to imaginative activity requires to be guided rather than resisted and frustrated. By a judicious course of training it may be transformed into the germ of a fine historical, scientific, or poetic imagination.

Stimulating the Imagination. Not only so, in average cases it is desirable to stimulate the imaginative power by supplying appropriate objects. The habitual narration of stories, description of places, and so on, is an essential ingredient in the rudimentary stages of education. The child that has been well drilled at home in following stories, will, other things being equal, be the better learner at school. The early nurture of imagination by means of good wholesome food has had much to do with determining the degree of imaginative power, and, through this, of the range of intellectual activity ultimately reached.

Conditions of Sound Training. In order to train the imagination wisely we must attend to the natural laws of its operation. Thus it is obvious that the constructive tasks imposed should be adapted to the experiences of the child. The first rule then is to see that the child has command of the necessary materials. By

[1] Hume, *Treatise of Human Nature*, Bk. I., Pt. IV., § 7.

these are meant not only the images which supply the elements or details of the mental picture, but a representation or representations which may serve as a rough model for the composition. Thus to take a simple example, a child will be aided to form a mental picture of a snow mountain not only by recalling the mountain form and the white snow, but also by referring to some familiar object which shall serve as type or model, as a loaf of sugar. The second rule is to awaken an adequate interest or motive. The materials provided for constructive activity, the scene described, or the action narrated, must be interesting and attractive, as well as within the child's grasp. Here the study of the emotional side of child-nature, and of its many variations is necessary.

Gradation of Exercise. The imaginative faculty, like every other faculty, must be called into play gradually. Not only must the constructive operation be adapted to the growing experience of the child, and the natural order of unfolding of his feelings, it must be suited to the degree of imaginative power already attained. Thus descriptions and narrations should increase in length and intricacy by gradual steps. The first exercises of the imagination should be by means of short accounts of interesting incidents in animal and child life. Such stories deal in experiences which are thoroughly intelligible and interesting to the child. The best of the traditional stories, as that of Cinderella, are well fitted by their simplicity as well as by their romantic and adventurous character to please and engross the imagination. And fables in which the moral element is not made too burdensome, and in which the child's characteristic feelings, *e.g.*, his love of fun, are studied, will commonly be reckoned among his favourites. When new feelings of curiosity unfold, and the imaginative faculty gains strength by exercise, more elaborate and less exciting stories may be introduced.

Children's Literature. It may be safely said that a good part of the so-called children's literature offends by inattention to the obvious conditions of success. It is not needful to dwell on the 'night mare' stories which injure children by disposing them to images of the terrible, though examples of this are not wanting in classical collections of fairy-tales. Nor need one refer to the 'goody' books which commonly weary them (when they succeed in engaging any measure of their attention at all). It is enough to touch on the common error of describing experiences, situations, impressions and feelings, quite out of their mental reach. The writers of children's books but too rarely have the art of looking at the world with the eyes of a young person. His powers of understanding and his emotional capabilities are alike over-rated. He is expected to understand intricate motives, to appreciate delicate touches of humour which would escape many an adult, and to manifest an æsthetic taste on a level with the latest refinements. Anybody who will take a little trouble to scan the so-called 'popular' children's stories of the present day, and what is more, carefully observe how children read them, will satisfy himself that even in this prolific age the stories which really come home to young minds are few enough.

Exercise of the Imagination in Teaching. As we have seen, the imagination is called into activity in all branches of teaching. In some branches, as History and Geography, it is more especially exercised. Here then a knowledge of the laws of operation of the faculty will be a matter of great importance to the teacher. A word or two must suffice on this head.

To begin with, since new images can only be formed out of old materials, it is desirable to call up past impressions in the most vivid way. This end will be secured to some extent by a wise selection of words. These must be simple and familiar, fitted to call up images at once. More than this, the teacher should remind the child of facts in his experience the representations of which may serve as the elements of the new image, or as its model. Thus in describing an historical event the several features must be made clear by parallel facts in the child's small world and the whole scene made distinct by the help of rough analogies. In doing this, however, the teacher must be careful to help the child to distinguish the new from the old and not to import into the new image the accidental and irrelevant accessories of his experience.

Once more, the teacher must seek to follow the natural order in exercising the imagination. He should remember that clear images are built up gradually. There is first a dim outline. a blurred scheme, and this gradually grows distinct by additions of detailed features. Thus the description of a country best begins with a rough outline of its contour, its surroundings, and its larger features, as mountain-chains, &c. Similarly historical narrative best sets out with some general outline of events which may serve as a time-scheme for the particular incidents to be dealt with. Not only so, the teacher should progress by steps from the known to the unknown and from the simple to the complex. The method in teaching geography, of setting out with the child's immediate surroundings, and gradually passing to more distant regions, illustrates the importance of the first condition. The practice in the teaching of history, of giving a biographical account of a sovereign with the least possible reference to social circumstances, illustrates the importance of the second condition. Finally, the imagination may be greatly aided by sense-presentations. It has been remarked above that fancy builds up its creations most easily when there is a basis of actual observation at the moment. And this condition is complied with by a judicious use of maps, models, pictures, &c.

APPENDIX.

The processes of constructive imagination have not been fairly dealt with by English psychologists. The accounts given by D. Stewart and Sir W. Hamilton are slight and inadequate. Prof. Bain deals more fully with the theme in his own manner under the head of 'Constructive Association' *(Senses and Intellect: Intellect,* Chap. IV.). Among German writers who have ably treated the subject may be mentioned George, *Lehrbuch der Psychologie,* 2nd Part, 5; and Volkmann, *Lehrbuch der Psychologie,* Section 4 D, § 84.

On the cultivation of the imagination the reader may consult Mdme. Necker, *L'Education,* Livre III., Chap. V., and Livre VI., Chap. VIII. and IX.; Beneke, *op. cit.,* § 23, 24; Waitz, *op. cit.,* § 10 *(Vom Spiele);* Pfisterer, *Pædagogische Psychologie,* § 14. There are some good remarks on practical constructiveness in Miss Edgeworth's Essays, Vol. II., Chap. XXI. (On Memory and Invention). The application of the psychology of the imagination to the teaching of History and Geography is well illustrated in Mr. Fitch's treatment of these subjects, *Lectures on Teaching,* Chaps. XII. and XIII.

CHAPTER IX.

CONCEPTION.

Particular and General Knowledge: Thought. The intellectual operations hitherto considered have had to do with individual things. To perceive, remember, and imagine have reference to some particular object, as the River Thames, or a particular occurrence, as the opening of the New Law-Courts. But we may reflect and reason about rivers or ceremonies in general. When we do so we are said to *think*.[1] All thinking is representation like imagination, but it is a different sort of representation. It is the representation not of individual things (*e.g.*, John Smith) but of classes (*e.g.*, Englishman, human being).[2] In thinking we are concerned not with single objects in their 'concrete' fulness of individual peculiarities or characteristics (*e.g.*, this tree with all its individual peculiarities of form, colour, &c.), but with certain of their 'abstract' qualities, that is to say aspects common to them and many other things (*e.g.*, the possession of

[1] Here again we have a word used in a sense somewhat different from its everyday sense. We often say we cannot 'think' of a thing when we mean we cannot recall it.

[2] Or inasmuch as it represents a number of concrete representations, it may be called, as it is by Mr. Spencer, re-representative.

life). This higher province of intellectual activity broadly marks off human from animal intelligence.

Thinking Defined. Thinking may be roughly defined as a going over, sorting, and arranging the store of particular cognitions gained by sense-perception and retained by memory. Like the simpler forms of cognition it consists in discrimination and assimilation, in detecting differences and agreements. It differs from these in the mode of exercise of these fundamental functions. Thinking is discrimination and assimilation performed on the results of sense-perception and reproduction. Not only so, as we shall see presently, it is assimilation and discrimination of a higher kind, involving much more activity of mind. To this it may be added that whereas in the knowledge of single concrete objects by sense-perception discrimination was the chief thing, and assimilation was a subordinate operation, in thinking the relation is rather reversed. To discover the general in the particular, to bring many individual things under one head, is to trace out the similarities of things; and to think is pre-eminently to detect similarity amid diversity.[1] At the same time, this process of detecting resemblances is attended, as we shall see presently with a clearer apprehension of differences.

Thinking and Understanding. Thinking is closely related to Understanding, and indeed the two words are often used to mark off the same region of intellectual operation. When we view an object as a

[1] Wit and poetic imagination when striking out similes exemplify, as we shall see presently, the same fundamental process. Wit and understanding have always been regarded as closely connected one with another.

concrete whole we *apprehend* it: when however we regard it under some common aspect we *comprehend* it. The child apprehends this particular building, that is to say as an individual thing distinct from surrounding things, having a particular shape, size, &c.: he comprehends it when he recognises it as a church. Similarly he understands an event when he assimilates it to other and already familiar events on the ground of a common cause. Thus he understands the fall of snow when he takes a lump into his hand and finds out that it has weight.[1] To understand things is thus to assimilate them to other things, and this is just what we mean by thinking.

Thinking based on Comparison. All thinking implies comparing one object with another. By an act of comparison is meant the voluntary direction of attention to two or more objects at the same moment, or in immediate succession, with a view to discover their differences or their agreements. The objects may be both present together, and placed in juxtaposition, as when a teacher compares the handwriting of a child with the copy; or, as often happens, may be (either wholly or in part) represented, as when we recall a person's face in order to compare it with another which we are now observing.

As we saw above, a child in perceiving an object discriminates and assimilates. Thus in recognising a figure as that of his father, he marks off the object in respect of height, &c., from other objects. In like

[1] The terms Thought and Understanding are often used for intellectual operations as a whole. The name of the highest manifestation of intellectual activity naturally tends to represent the whole of the activity.

manner when he recognises an object as an orange, he assimilates it to other and previously seen objects. Yet here the differences and similarities are latent, so to speak. The child does not distinctly recall other figures from which that of his father differs, nor does he distinctly recall other oranges which the present one resembles. The relation of likeness or unlikeness is implicitly seized, but it is not explicitly set forth to the mind.

This last process involves a further intellectual activity which is known as comparison. In this we place the objects differing or agreeing in mental juxtaposition, so as to distinctly view them as related by way of similarity or dissimilarity. This act of comparing objects involves the germ of thinking, and marks a certain development of intellectual power. An intelligent dog can distinguish and recognise, but he cannot mentally juxtapose objects or compare them, except, perhaps, in a very imperfect and rudimentary way.

This act of comparing two objects illustrates the highest kind of exercise of the power of voluntary concentration. In viewing two or more objects in their relation one to another a peculiar effort of mental fixation is involved. The attention has to pass rapidly from one to the other in order that the point of dissimilarity or similarity may become clear and well-defined. It may be added that the juxtaposition in space of two objects greatly assists in the detection of likeness or unlikeness. Such proximity of the object is most favourable to a rapid transition of the attention, and an (approximately) instantaneous co-observation of the two in their relation.[1]

As one derivation of the word suggests (Lat. *comparare*, from *con* and *par*, equal; *cf.* Germ. *vergleichen*, from *gleich*, like or equal) comparison refers more particularly to the discovery of resemblances. The comparisons of wit, and of poetic fancy, are clearly illustrations of the process of assimilating or likening one thing to another. Even when we compare two things so as to note their differences, the idea of their likeness is implied. We only compare them by first bringing them together and regarding them under some aspect of similarity, *e.g.*, height in the case of persons. In truth we only talk, generally speaking, of comparing things when there is a considerable amount of likeness, and when accordingly the detection of difference (if such there be) necessitates close concentration of mind, as in inspecting two similar handwritings, two similar coins, &c. Hence the expression: 'They are too unlike to be compared'.

Comparisons which involve Reproduction. The process of comparing assumes a somewhat different form when the objects to be compared are not presented at the moment. This, as before hinted, is the common case. The range of thinking would almost be reduced to a mathematical point if our minds were confined to the accidental juxtapositions of objects in space, and of events in time. By the aid of memory we are able to bring together objects and events far removed from one another in our experience, and in this way to give unity and order to our experience as a whole.

In this representative mode of comparison the images are commonly called up by the force of similarity itself. Thus in comparing a person's face with another previously seen, the first step in the process

[1] On the nature of comparison, see Hamilton, *Lectures on Metaphysics*, Vol. I., Lect. XIV.; Lotze, *Metaphysic*, Book III., Chap. III., and Stumpf, *Tonpsychologie*, § 6, p. 111 *seq.*

is the revival of the image of this last in the manner already explained (p. 266). The *act* of comparison follows, and consists of a reflection on the point or points of similarity, already vaguely discerned, with a view to render these distinct or definite.

Comparisons of Wit and Fancy. This same process of representative comparison is illustrated in the assimilations of remote objects or ideas in strokes of wit, and poetic similes. The source of the intellectual pleasure in each case is the sudden discovery of some affinity between things which we have hitherto been accustomed to view as totally unlike and disconnected.[1] The mental juxtaposition is due in the first instance to the attraction of similars. It is the similarity of the words in a pun, or of the ideas in wit proper, and in poetic fancy, which causes the two to come together in the mind. And the mind which is quick at striking out witty comparisons, or poetical similes, must be peculiarly susceptible to this mode of suggestion by similarity. But this is only a part of the process. The final perfectly elaborated parallel or analogy implies (in most cases at least) a careful comparison of the things thus brought together, a detection of the precise point of analogy between them, and a setting this forth clearly to the mind.

Analysis and Synthesis. Thinking is often described as a process of separating and combining, or of analysis and synthesis. By mental analysis we mean the taking apart of a complex whole and attending separately to its parts. By synthesis, on the other hand, is meant the reverse process of combining parts in a complex whole. Just as the chemist analyses and recombines his substances, so the mind is capable of breaking up a complex product into its parts and re-grouping them.[2]

[1] Of course this is not the only ingredient in the charm of wit or of poetic simile. The pleasure in both cases seems to be a complex mental state.

[2] The analogy between physical and mental analysis and synthesis only holds up to a certain point. On the different uses of the words see the article *Analysis* in the 9th Edition of the *Encyclopædia Britannica.*

It is plain that in finding out the similarities of things we analyse. A percept and its corresponding image are, as we have seen, highly complex, made up of an aggregate of many sense-impressions, and involving many relations of parts one to another. Thus in representing an orange the mind grasps a whole group of properties, form, colour, &c. When we consider the similarity of an orange to other things, *e.g.*, other fruits, or other globular bodies, we pick out certain aspects of the object and consider these separately, that is we analyse.

But analysis though a very important part of thinking is not the whole of it. Thinking involves processes of combination or synthesis as well. In forming the idea planet, for example, the mind combines the results of previous processes of analysis, such as the idea of a spherical body, of motion about a centre, and so on. An important part of thinking is concerned with discovering the causal relations which bind objects and events together; and this operation involves a bringing together of ideas hitherto disconnected. When, for instance, the child finds out that snow, sugar, and other things are melted by heat he connects the idea of melting with that of heat.[1]

Our knowledge of particulars may be said to imply the germs of analysis and synthesis. In sense-perception we single out some object, or part of an object, for special notice, disregarding its surroundings. And this selective process of the attention is a kind of analysis. Again, since a percept is a complex psychical product formed by a coalescence of sense-elements, we may say that it is the result of a kind of 'uncon-

[1] The meaning of synthesis will be brought out more fully presently in connection with judging and reasoning

scious synthesis'. Once more, in the processes of reproduction we found both a separating of images from their surroundings as well as a combining of them by an act of conjoint attention. The germ of the process of synthesis is best illustrated in constructive imagination.

It follows from this that the words analysis and synthesis may be extended so as to correspond more nearly to the terms discrimination and assimilation. We may be said to analyse a sense-impression, perception, or idea, whenever we distinguish some element or aspect of it from its surroundings. On the other hand, when we mentally combine things on the ground of their resemblance we may be said to perform a process of synthesis. If we were to employ the terms in this wider sense, we might say that analysis and synthesis (discrimination and assimilation) are but two sides or aspects of the same mental process. To single out any part of a (complex) sensation or idea for special consideration, is to bring it into relation to other and similar sensations or ideas.[1]

Thinking and Language. It is allowed by all that there is an intimate connection between thinking and language. Man is distinguished from the lower animals by the attribute of speech as well as by that of understanding. The thinking powers of the several races of mankind vary with the degree of complexity and elaborateness of their language. The child's power of thought grows step by step with his power of speech. Much of our thinking is plainly carried on by the aid of spoken language, namely all that is connected with conversing or exchanging ideas. And even in the case of solitary or silent thought, internal observation at once tells us that an inaudible or suppressed speech co-operates.[2]

Language is in its very nature a system of *general* signs or symbols which may be applied to an indefinite

[1] This is generally true, though, as we saw before, discrimination seems the more fundamental part or first stage of the process (see p. 142).

[2] In the case of all of us, and more particularly, perhaps, the uneducated, this inaudible speech is apt to become audible.

number of objects. And it is only by the help of language (or some other equivalent set of signs) that we can think, in the strict sense of the word, that is to say, consider things under their general or common aspects. In dealing with memory we saw how important a part language played as a medium of representing the concrete, or of recalling particular objects or occurrences. We shall now have to deal with a yet more important function of language, that is to say, its service as a medium of representing the general or abstract, or as an instrument of thought.

Stages of Thinking. We commonly distinguish three stages of thinking. First of all there is the formation of general notions or concepts, which may be said to constitute the elements of thought, such as 'material body,' 'weight'. This is called Conception. Next to this comes the combining of two concepts in the form of a statement or proposition, as when we say 'material bodies have weight'. This is termed an act of Judgment. Lastly, we have the operation by which the mind passes from certain judgments (or statements) to certain other judgments, as when from the assertions 'material substances have weight,' 'gases are material substances,' we proceed to the further assertion 'gases have weight'. This process is described as Reasoning, or drawing an inference or conclusion.

These distinctions have been fixed by logicians and not psychologists. The mental process in each case is substantially the same. Not only so, as we shall see presently, these operations are not carried on separately, but are involved one in the other. Nevertheless, since they roughly mark off the more simple and the more complex modes of thinking, and products of thought, it is convenient to the psychologist to adopt the distinctions. We shall accordingly in the present chapter deal with the process of conception, or concept-formation, and in the following chapter consider the processes of judging and reasoning.

Logical and Psychological View of Thinking. The reader must carefully distinguish between the different ways in which the Logician and the Psychologist view the processes of thinking. The former is concerned in regulating or controlling the operations according to some standard of correctness. He requires a comparatively simple form or type of thinking by a reference to which the value of any specimen of actual thinking may be guaged. Hence he does not need to go into a careful and exhaustive analysis of the ordinary processes of thinking in concrete individual minds. Thus he assumes that concepts are fully developed before they are combined in judgments. Similarly he assumes that when we reason (deductively) we set out from a general truth in the way indicated by the syllogism.

The psychologist, on the other hand, is concerned not with the question 'How can we think correctly?' but with the question 'How do we ordinarily think?' Hence he has to make a much more careful analysis of the actual processes of thinking. Thus he has to keep in mind the fact that Conception and Judgment are closely connected one with another, and that our reasoning processes are much more variable in form than is assumed in Logic.

Definition of General Notion or Concept. A concept, otherwise called a general notion or a general idea, is the representation in our minds answering to a general name, such as soldier, man, animal. There has been much discussion concerning the nature of these general representations, or 'abstract ideas' as they are sometimes called. It is clear that they are related to concrete images of particular objects. Thus the concept 'soldier' is connected in my mind with the representations of various individual soldiers known to me. But when I use the word 'soldier' I do not fully represent any individual soldier with his particular height, style of uniform, &c., nor do I distinctly represent a succession of such individuals. What is in my mind is a kind of composite image formed by the fusion or coalescence of many images of single objects, in which individual differences are blurred, and only the common features stand out distinctly. Thus my representation of a soldier corresponds to a rough sketch of the soldier figure with some kind of uniform and carrying some kind of weapon. This may be called a typical or generic image.[1]

As was suggested above, even images of single objects have something of the character of generic images. My image of a particular place or of a particular person is really compounded out of many slightly different perceptions. Thus we see Hyde Park now in good weather now in bad, now in summer now in winter. Similarly we see one of our friends in different surroundings, wearing different expressions, and performing different actions. In each case the resulting image or representation is a conglomerate of a number of partially unlike percepts, in which the common elements strengthen one another and the variable ones tend to cancel or obliterate one another.[2]

If instead of the word 'soldier' we take 'animal' we find still less of the image-character. We cannot form a mental picture of animal in general. The word covers too wide a variety of forms (dogs, mice, beetles, and so on), for us to combine the corresponding images in a generic image. These more 'abstract' concepts do indeed contain a shadowy

[1] A colour-element answering to the most frequent accompaniment, say scarlet, might also enter into the image.

[2] See Taine, *On Intelligence*, Pt. I., Bk. II., Ch. II., p. 88.

reminiscence of images. Thus the word 'animal' seems to call up very vaguely one or more (generic) images corresponding to the variety of animal most familiar, as the well known quadrupeds. But we *distinctly* represent only a limited side or aspect of these, that is to say the features, traits or qualities which are common to them. Thus the word 'animal' may be roughly said to call up the idea of a material body of a symmetrical but otherwise ill-defined form, endowed with life and movement.

It is important to distinguish between a concept proper, a fully developed and independent mental product, and a concept in its nascent incomplete form as embodied in a percept. Just as a sensation commonly nvolves the germ of a percept, and a percept the germ of an image, iso a percept (and the image formed from this) may be said to contain the germ of a concept. In seeing an individual object as a particular tree we view it as a concrete embodiment of the common tree-form. Recognition of an object present to sense as one of a class thus involves a nascent form of the concept. But this process is not the same as the independent forming of a concept by means of a word when no object is present. The former is an easier intellectual operation and precedes the latter in the order of mental development. Children can identify an object as one of a class (as when they say, 'There is a dog!') before they can call up distinct concepts by the aid of language only.

How Concepts are formed. The more concrete concepts or 'generic images' are formed to a large extent by a passive process of assimilation. The likeness among dogs for example is so great and striking that when a child already familiar with one of these animals sees a second he recognises it as identical with the first in certain obvious aspects. The representation of the first combines with the presentation of the second bringing into distinct relief the common dog-features, more particularly the canine form. In this way the images of different dogs come to overlap, so to speak, giving rise to a typical image of dog.[1] Here there is very little of active direction of mind from one thing to another in order to discover where the resemblance lies: the resemblance forces itself on the mind.[2] When, however, the resemblance is less striking, as in the case of the more abstract concepts (*e.g.*, animal), a distinct operation of active comparison is involved. This is the operation which we have now specially to investigate.

Comparison, Abstraction, and Generalisation. The active mental process by which concepts are formed is commonly said to fall into three stages, comparison, abstraction, and generalisation. These are however very intimately related, and are only distinguishable aspects of the same mental operation.

First of all it is needful that a number of objects having a certain degree of likeness should be somehow brought before the mind. As already pointed out, these objects may be actually present or may be called up by the representative imagination. We then compare them, that is regard them by a special act of attention in their mutual relation, in order to see how far, and in what respects, they resemble one another.

Now when things are widely unlike one another, as

[1] Mr. Galton compares these generic images to composite pictures formed by the overlapping or superimposing of a number of photographic impressions on a plate. See *Inquiries into Human Faculty*, Appendix, 'Generic Images,' p. 349.

[2] This relatively passive process which is clearly brought out in Mr. Galton's theory of generic images, has been fully recognised by German psychologists. See Waitz, *Lehrbuch der Psychologie*, § 48, Die Abstraction.

for example different fruits, as a strawberry, a peach, and so on, we must in order to note the resemblance turn the mind away from the differences of form, colour, &c. This is the difficult part of the operation. Great differences are apt to impress the mind, and it requires a special effort to turn aside from them and to keep the mind directed to the underlying similarity. This effort is known as abstraction. It implies a high exercise of the power of voluntary attention acting in opposition to what is impressive or *interesting* (see p. 98).[1] The greater the vigour of mind thrown into this act of abstraction, the clearer or more perfect will be the detection of the common features (*e.g.*, the fruit marks or traits).

Finally, having thus seized by an effort of abstraction the common traits of the several individual objects compared, the child *generalises*, that is to say forms a notion of a class of things which have the qualities detected. Thus out of the images of apple, plum, &c., he builds up a concept of the class, fruit.[2]

Conception and Naming. This process of concep-

[1] Abstraction means etymologically the active withdrawal (of attention) from one thing in order to fix it on another thing (Lat. *ab* and *traho*). Although we commonly speak of abstraction in reference to turning away from differences to similarities the same process shows itself in other forms. Thus in looking at a face we may withdraw attention from the eyes and fix it on some less impressive feature. If two things (*e.g.*, two sheep) are very like we need to make an effort of abstraction in order to overlook the similarities and attend to the differences.

[2] This last part of the process is also spoken of as classification, since it involves the formation of an idea of a class of things. But the process of classification is, as we shall see presently, more complex than this. The relation between the last two stages of the process of Conception—Abstraction and Generalisation, will be discussed presently.

tion takes place in immediate connection with naming. For the sake of simplicity we will first suppose that the child begins to use the name when he compares a number of objects, and seizes the points of resemblance among these; just as a scientific discoverer invents a name to mark off some newly-discovered class of things. He applies the term fruit to the various objects compared and found to have certain common characters or marks. The name is thus given not to one object but to a number; and it is given to them with special reference to their points of similarity. That is to say, by being given to the several objects, pears, oranges, &c., the name serves in a peculiar way to indicate, define, and fix this relation of similarity among them. But for the appending of a name the recognition of points of similarity would be vague and momentary only.

The full importance of the process of naming, or appending general signs to, the results of the comparison only appears afterwards. The resulting concept is the effect of combining a number of compared images by means of one common name or sign. Owing to this, a peculiar association will be constituted between the word and the images of the several objects.

After the process described above is complete, the child on hearing the word fruit will not form a concrete image, as that of a pear of a particular size. For this same verbal sign has been associated in precisely the same manner, and with precisely the same degree of strength, with other objects, plums, peaches, &c. It is clear that the name cannot at one and the same moment call up all these images. The representations of the forms of the pear and the apple, and of the colours of the grape and the orange, are plainly incompatible or mutually exclusive. And since the name is coupled with all alike, there is no special tendency in it to call up one image rather than another. Hence it does not call up any one image in its completeness, but only a number of nascent or incomplete images in which the several tendencies to complete development, with all the concrete details distinctly pictured, are counteracted, or, in other words, in which the individual differences are cancelled. That is to say, the word as a general sign corresponds to a group of representations or to that typical mental scheme or framework, which has been defined above as a concept.

For the same reason, our observer will be henceforth disposed to apply the name fruit to any object (familiar or unfamiliar) in which he discovers the marks or characters specially associated with the name. Thus on seeing a lemon or a fig, he will call the object a fruit. That is to say just as on meeting with the name the concept or typical idea will be called up, so on meeting with any of the corresponding things the name will be called up. The name has thus become a class-name, *denoting* a number of objects resembling one another in certain particulars; and *connoting* these common characters by virtue of which the objects are mentally connected and called by one name.[1]

We must now, however, abandon the supposition

[1] According to logicians, every concrete general name denotes or points out things, and connotes the common attributes of these things. See J. S. Mill, *System of Logic*, Bk. I., Ch. II., § 5.

that the child fashions his concept at one time and in the systematic way described above. The process of abstraction is a slowly progressive one. Thus the notion fruit is only gradually extricated from percepts and images after many successive comparisons, each of which adds an element of exactness to the growing concept. And this implies that words are not at first used as general signs. Thus the name fruit might at the outset be applied to one kind, or at most to two kinds, of fruit. At this stage it would call up a blurred image, or a nascent or rudimentary concept only. The growth of the concept progresses step by step with the extension of the name to new objects. Only after numbers of partially unlike images have in this way been conjoined with the word, and repeated processes of abstraction have taken place, does the name become a general sign or concept-symbol, properly so called.

Discovering the Meaning of Words. One other correction of the above account of the conceptual process remains to be made. We have supposed that the child brings objects together and compares them on his own account without any guidance from others. This process does actually take place. Children discover resemblances among things and call them by the same name quite spontaneously and without any suggestion from others. At the same time it is obvious that the greater part of their concepts are formed (in part at least) by listening to others and noting the way in which they employ words. The process is in this case very much the same as before. A child finds out the meaning of a word, such as 'man,' 'good boy,' and so forth, by comparing the different instances in which it is used, abstracting from the variable accompaniments and fixing the attention on the common or essential circumstance.[1]

Nominalism and Conceptualism. The nature of general notions, concepts, or 'abstract ideas,' and their precise relation to names, has given rise to much discussion. This discussion had its origin in a properly *philosophical* question, namely that respecting the nature of general *knowledge*. It was asked whether there is any external reality corresponding to our general notions, *e.g.*, 'man,' over and above that of certain individuals whom we have seen, or we or others might see. Certain thinkers have held that there is a universal reality, that in the region of external existence there is something corresponding to 'man' as distinct from 'James Smith,' 'John Brown,' &c. These were called Realists. In opposition to these the Nominalists asserted that the universal or general has no existence in the realm of nature or objective reality, but only in the name as a common sign applicable alike to any object of a certain kind.

In modern times the controversy has tended to assume the character of a *psychological* discussion. Instead of the ancient Realists we have the Conceptualists, who assert that our *ideas* may be general, or that the mind has, over and above the power of picturing individual objects, that of forming general notions, or ideas of classes of things. These general ideas are not 'sensible representations' of individual objects, but abstract ideas, that is representations of the common features (or the relations of similarity) of many individuals. In opposition to these the Nominalists assert that when we use general names we are still picturing or imaging individuals, but in a very imperfect way, that is by attending exclusively to certain features marked off by the general name. The nature of the concept is only understood by considering the function of general signs. Inasmuch as a name is such a sign, applicable alike to an indefinite number of individual objects, we are able by means of it, and the truncated image immediately called up by it, to think or reason in a general manner. The word has become the symbol of an indefinite number of images corresponding to those concrete examples which we have seen, and to those which we can imagine ourselves as seeing under certain circumstances. If the simultaneous rise of all these images in their full

[1] It may, perhaps, be said that owing to the circumstance that unlike objects are found to have the same name, there is in the child's mind an anticipation of the generalising stage. Words are recognised as names of many objects before the processes of comparison and abstraction have been carried out.

distinctness were psychologically possible, this, so far from aiding thought (*i.e.*, considering or reflecting about things in their general aspects) would frustrate it. The name owes its important use or function in thinking to the circumstance that it has in a manner become a *substitute* for these, their potential rather than their actual sign.[1]

Psychology of Language. We see from the above that the function of language in thinking resembles in certain respects its function in imagination. Just as a word as a particular mark or sign may enable us to recall and make known to another some concrete fact, so as a general sign it aids in the preservation and communication of general ideas or knowledge. And the same excellences of our adopted system of language which we found to be so useful in the one case are equally useful in the other. The accuracy and facility of thinking turn in no small measure on the fine discrimination and distinct reproduction of sounds together with the correlated vocal actions, and on their flexibility and susceptibility of combination in easily apprehended series (see above, p. 249).

It must be observed however that the relation between words and general ideas or concepts is a much closer one than that between words and images. In recalling a succession of events we may have hardly anything before the mind but a string of visual images, there being only a vague accompaniment of verbal representations. But when we think, we are dependent at every step on distinct verbal representations. This arises from that close organic connection between the name as a common or general sign and the image-aggregate or concept which we have just illustrated. The name is the combining force, the 'vital principle' which holds together this aggregate and keeps it from falling apart again into its constituent images.

[1] Nominalists do not perfectly agree as to what is in the mind when we use a general name. Some say it is one image with all individual features repressed or obscured. Others say that it is a number of images. It probably differs greatly at different times, according to the fluctuations of our experience. Since it is allowed that we are capable of attending exclusively to the common features of the image or images present at the moment, and of overlooking all individual peculiarities, there does not seem to be a wide gulf between this view and the conceptualist doctrine that the concept is different in its nature from 'sensible images' of individuals, and is a representation of 'an intelligible relation' among individuals (Mansel). Mr. Galton's doctrine of Generic Images seems to offer to some extent a basis of reconciliation for the rival views. For a further account of Conceptualism and Nominalism, see Hamilton, *Lectures on Metaphysics*, II., XXXV.; Mansel, *Prolegomena Logica*, Chap. I., p. 13, &c.; J. S. Mill, *Examination of Sir W. Hamilton's Philosophy*, Chap. XVII.; Dr. Bain, *Compendium of Mental Science*, Bk. II., Ch. V., *cf.* Appendix A; and M. Taine, *On Intelligence*, Pt. I., Bk. I., Chaps. I. and II.; Pt. II., Bk. IV., Chap. I.

Language and Speech. As was pointed out in dealing with its relations to reproductive imagination, language is something more than a system of finely differenced auditory impressions. It has an active or motor side as well, which aspect is marked off by the term Speech. Every element of a language is thus two-sided, consisting of a vocal action, and a sound-impression resulting from this. That this active side is of great importance, may be seen in the fact that when other signs than auditory ones are resorted to, as in the visible gesture or pantomime language of uncivilised races, and the manual sign language of the deaf and dumb, a correlative action or movement always appears.

The explanation of this is that language is a social phenomenon, having its origin in social relations, and having for its function to subserve the communication of mind with mind, and the formation of that aggregate or organised body of common experience which we call knowledge. The relation between the vocal action and the sound-impression answers to the communication of an idea or piece of knowledge by one mind, and its reception and comprehension by another.

The close correlation between language and social life only becomes apparent when we regard it in its full significance as a system of *general* signs. Particular impressions are (to a large extent at least) confined to an individual, or at most to a few individuals: they depend on the accidents of time and place. The common body of knowledge is thus necessarily general. It consists of the particular observations of many individuals combined and organised in general truths. And this generalising or universalising of knowledge, this piecing together and elaborating of the individual fragmentary portions of knowledge into an organic unity is effected, and can only be effected, by the aid of general speech.

This being so, we see that speech is the medium by which a double process is continually going on. On the one side by the use of a common speech the social mind is working on the individual mind, communicating of its store of knowledge, and bringing the individual intelligence into conformity with its fixed modes of activity or 'forms of thought'. This side of the process answers to instruction and intellectual education in the wide sense of the term. On the other side, by falling in with the common speech the individual is continually adjusting (consciously or unconsciously) his intellectual habits to these common forms. Every time he uses general speech he is virtually stepping away from the isolated individual point of view, and adopting the central social point of view. To employ the common speech is thus a social act, a recognition of an authority above the individual. Not only so, this use of the organised speech-structure by the individual implies social co-operation. By employing it the individual puts his private or particular knowledge in a form which renders it generally available. And in this way the individual is able to react on the common forms of thought and the connected forms of speech.

Physiology of Speech. The close connection between speech and thought appears plainly enough in what is known respecting their physiological conditions or nervous concomitants. A general idea or notion being built up out of visual percepts and images, is regarded by the physiologist as involving certain complex processes in the (sensory) centres of perception and imagination (called by some ideational centres). And it is held that these complex nervous processes are dependent on the co-ordination of these centres with other centres known as speech centres. These last, corresponding to the psychical couple, vocal action and sound-impression, are partly motor and partly sensory. Pathological evidence goes to show that the integrity of these speech centres is necessary to a due performance of the higher intellectual operations.[1]

Growth of Language and of Thought in the Race and in the Individual. The question as to the psychological relation of language to thought is closely connected with the problem of the origin of language in the history of the race. In spite of the series of elaborate researches commenced by Herder, there is still a good deal of uncertainty on this point. We may, however, pretty safely say that both the view that regards the origin of language as due to a conscious process of invention which presupposes a considerable development of the power of thought; and the opposite view which makes the growth of thought wholly a result of the possession of the organ and the power of speech, are one-sided and inexact. The mere possession of an organ of speech would not guarantee the development of language without some correlative development of brain-power and thought. On the other hand, thought could never have reached more than a rudimentary or nascent stage without the aid of language. Thus the growth of thought and of speech react one on the other.[2] The interaction of thought and language is well described by Sir W. Hamilton by aid of a simile, the relation between the processes of excavating and propping up with masonry in boring a tunnel. "Language is to the mind precisely what

[1] For a fuller account of the physiology of speech, and the kindred processes of reading from visual symbols and writing, see Dr. Maudsley, *The Physiology of Mind*, Chap. VIII. ; Dr. Ferrier, *The Functions of the Brain*, Chap. XI. ; Dr. Bastian, *The Brain as an Organ of Mind*, Chap. XXIX.

[2] The question of the origin and development of language, though not considered a part of psychology, has an important bearing on the science. And this relation between philology and psychology is coming to be recognised by psychologists, especially in Germany. For the latest theories on the origin of language, the reader must be referred to the works of Professors Max Müller and Sayce in this country, and of Geiger, Steinthal and Noiré in Germany.

the arch is to the tunnel. The power of thinking and the power of excavation are not dependent on the word in the one case, on the mason-work in the other; but without these subsidiaries, neither process could be carried on beyond its rudimentary commencement" (*Lectures on Logic*, VIII., pp. 138, 139).

It is a somewhat different problem when we consider the relation of the growth of thought and of speech-power in the case of the individual. Here, again, the powers of speech (articulation) and of thought develop *pari passu*. To some extent he reproduces the probable course of things in the early development of language in the race by spontaneously uttering word-sounds of his own invention in order to indicate the resemblances which he discovers in things.[1] But this spontaneous speech is soon abandoned in favour of that adopted by others and impressed on him by way of his social needs and impulses. And it is plain that this process of learning and reproducing a highly-developed speech-structure, embodying the thought distinctions and thought relations of many generations, is widely different from that of groping the way after new sounds as new ideas arise. Through this action of the speech-medium the progress of intellectual growth is furthered and expedited to an incalculable extent. The child becomes familiar with concepts such as 'thing,' and relations of these, as 'cause' and 'effect,' long before his unaided intelligence could have even dimly descried them.

The difference between the two processes of growth here touched on affects the interesting psychological problem, how names of things were first used, whether as names of individuals (proper names) or of classes (common names). The difficulty here, in the case of the first employment of words by the individual, is owing to the circumstance that he is surrounded by those who use words as general signs to denote a number of partially dissimilar objects. The probability seems to be that the child first uses words to mark the resemblances of things which strike him. And this, whether the object be the same object seen after an interval, as in exclaiming 'Papa' on seeing his father after an absence; or different objects, as when he extends the word 'Papa' to other men. 'Same thing' is distinguished from 'similar things' later.[2]

[1] M. Taine would regard such utterances as analogous to emotional expressions. They express the emotive state of mind of the observer who is struck by a resemblance (*On Intelligence*, Part I., Book I., Chap. II.). This view connects the early speech of the individual with the speech of primitive man in so far as it was the expression of an emotional state either of an individual or of a number in common.

[2] The question whether knowledge begins with the individual or the general (the problem of the Primum Cognitum) is fully discussed by Sir W. Hamilton in his *Lectures on Metaphysics* (Lect. XXXVI.).

Degrees of Abstraction. Our more concrete concepts (generic images) involve, as we have seen, but little active comparison. In arriving at the concepts plough, dog, and so on, the child finds no difficulty in turning away from differences. Resemblance here preponderates over difference, and the exercise of the power of abstraction is slight. It is only when we carry the process of analysis further and seek out more widely extended points of similarity that a serious effort of abstraction is required. Thus in finding out what is common among ploughs, saws and other *implements*, or what is shared in by dogs, horses and other *quadrupeds*, the child needs to consider closely and turn away from many and striking differences. Speaking roughly, we may say that the wider the range of objects compared the smaller will be the amount of resemblance among them. And the more dissimilarity thus preponderates over similarity the greater will be the effort of abstraction required.

Marking off Single Attributes. By abstraction, finally, we can view things under some one aspect common to them and other things, as rotundity of form, colour, and so forth. The separate detection of such attributes is marked by the use of adjectives. When, for example, the child calls his ball round, or his cart heavy, he is able to fix his mind on some one feature of an object. Here again comparison and generalisation are involved, though less obviously. The child would not call his ball round if he had not seen a number of round objects and compared them under this aspect. And to call a thing round implies at least a vague notion of a class of round objects. This higher power of abstraction enables the child to carry the process of analysis still further, and not only to break up his percepts (or images) so as to form (complex) notions of classes, but to break up these notions of classes into simple notions of qualities, distinguishing and enumerating the several features or marks which constitute the class. Thus he is able to analyse his notion water into something fluid, transparent, and so on.[1]

Formation of Abstract Names. Logicians distinguish between adjectives as red, round, and the substantives formed from these as redness, roundness, calling the first concrete names or names of things, and the latter abstract names or names of attributes. But the psychologist views them as answering to two modes of the same fundamental process of abstraction. There is no material difference between the notion or idea 'heavy object' and the notion 'weight'. We cannot conceive a quality apart from a thing possessing it. But by the help of language we are able to mark off a common trait of many things with only a very vague reference to the concrete objects themselves, and this final stretch of abstraction is illustrated in the formation of ideas of qualities, states, actions, &c., corresponding to abstract names. That such concepts answer to the more severe efforts of abstraction is seen in the fact that the names are derived from, and therefore formed later than the corresponding concrete names; and also by the fact that they are first used by the child long after these last.

Abstraction and Generalisation. A good deal of discussion has arisen respecting the exact relation of Abstraction to Generalisation. In the process of concept-formation described above the two are clearly very closely connected. But does abstraction always imply generalising? Dugald Stewart writes: "A person who had never seen but one rose might yet have been able to consider its colour apart from its other qualities; and, therefore, there may be such a thing as an idea

[1] When this stage of abstraction is reached the complex class-notion may be more distinctly *re*formed by combining the qualities thus separately conceived. Some writers (as Sir W. Hamilton) describe this as a process of synthesis. This, however, must be distinguished from the process to be touched on presently, where the mind brings together the results of abstraction which have not been hitherto connected. This is synthesis in the fuller meaning of the term.

which is at once abstract and particular".[1] But there is no reason to suppose that we could attend to the colour of a rose before comparing many objects in *respect of their colour.* A young child cannot attend to the colour or the form of an object apart from its adjuncts or surroundings. Such a recognition of a particular quality in any object presupposes a considerable development of the powers of conception. And it is by the aid of the results of comparing and generalising that we are able to fix the attention on any quality of a concrete object, isolating it for the moment from its surroundings. Hence it may be said that such abstraction always involves an indistinct or sub-conscious process of generalising. In attending to any single quality of an individual object we are ceasing to regard it as an isolated object, and are viewing it in its relation to other objects. This is true even of some individual peculiarity of form, &c. For in attending to it *as form,* we are carrying out a rudimentary process of generalisation. This is only to repeat in other words what was suggested just now, that analysis, or the singling out for special consideration of some particular aspect of an object, implies synthesis in the sense of assimilating the object on that side to other objects.[2]

Notions which involve Synthesis. Many of our notions involve, in addition to a process of abstraction and analysis, a process of combination or synthesis. That is to say, we require to regroup the results of abstraction in *new* combinations. Thus in the study of history we have to build up out of the results of observation and abstraction such notions as 'Roman Emperor,' 'feudal system,' &c.

This process, the synthetic formation of complex concepts, goes on in many cases hand in hand with a

[1] Quoted by Hamilton, *Lectures on Metaphysics,* Vol. II., XXXV.

[2] The attending to a distinct aspect or quality of an object must be distinguished from the fixing of the eye on a certain locally distinct portion of it. This last, though often called abstraction, does not involve withdrawal of the attention from individual differences to characters common to many objects. It may be added that the same close relation between analysis and synthesis holds good in respect of complex sensations, as those of mixed flavour, musical timbre, &c. Our power of separating such a complex whole into its parts depends to a considerable extent on our previous familiarity with the constituents apart or in other connections.

process of constructive imagination. By this last an image, or a number of images, are first elaborated, which give the peculiar form or structure to the concept. In this way we should form an idea of a Roman consul, of a volcano, and so forth. In other cases, however, this accompaniment of constructive imagination is wanting. Conception passes beyond the limits of distinct visual representation.

Ideas of Magnitude and Number. This process of transcending the limits of imagination is illustrated in the formation of ideas of all objects of great magnitude and of these magnitudes themselves. Our ideas of objects of small size, as a single building, a troop of soldiers, a yard-measure or a bushel, as well as of small durations, as a second, are all based on percepts and images. On the other hand, our notions of objects or collections of vast size, as a city, a planet, a nation, the distance from the earth to the sun, and of vast durations, as a century, do not correspond to any distinct images. These ideas are reached by a process of continued summation or addition of magnitudes which are themselves intuitable and picturable Thus in forming an idea of the earth we have to take some familiar magnitude, say that of a school globe, and to perform a prolonged process of piling up quantity on quantity, or measure on measure.

The nature of this process is clearly illustrated in the building up of the ideas of all the larger numbers.[1] As was pointed out above, we can intuit the smaller

[1] All distinct ideas of magnitudes which are not imaginable are of course formed by the aid of numbers. We can have no idea of a vast distance except as determined by a definite number of unit-measurements, *e.g.*, feet, yards, miles.

numbers as groups of things characterised by certain visual differences (see p. 192). Our ideas of such numbers, therefore, might be obtained by comparison of different local arrangements of the same group, and of groups of unlike things, *e.g.*, pebbles, trees, sheep. Even in the case of these smaller numbers, however, a process of composition and decomposition (synthesis and analysis) was found to be involved. We only fully apprehend 5 or 6 as a particular number, when we know its mode of production by a summation of units. In the case of the larger numbers, 20, 100, 1000, &c., this process of summation makes up the whole meaning of the number-symbol. The symbol 100 does not correspond to an intuition of sight, or to a visual image. It stands for the unpicturable result of a prolonged process of summing, counting, or reckoning, performed on units (or small groups of these) which are themselves picturable.

This peculiarity of our ideas of number is illustrated in the lateness of their formation in the history of the individual and of the race. Thus, a child of three and a half, generally observant and intelligent, and capable of comparing the magnitudes of things (*e.g.*, the heights of two persons), showed an almost complete inability to apprehend relations of number. Though taught to say one, two, three, &c., in connection with concrete objects, he persisted in confounding number or discrete quantity, with magnitude or continuous quantity. Thus one day on seeing beads of three sizes, he called the smallest 'four,' those next in size 'five,' and the largest 'six'. It is well known that savages, though they are able to remark a diminution in the number of their cattle, &c., because they know each individually, are rarely able to count above 5, and at most only attain to 10. This suggests that reckoning was first developed by aid of the fingers of the two hands, which supply an always available concrete illustration of number, and which would naturally come to be used as a symbol for number in the early gesture stages of language.[1]

It may be added that certain notions of magnitude and number illustrate the reverse of the process here described. In forming an idea of a molecule, of a millimetre, &c., we are breaking up or dividing an intuitable whole into its parts and carrying the process beyond the limits of imagination. So of the ideas of all small abstract quantities represented by fractions. We may form an image corresponding to $\frac{1}{3}$ because we may picture an object separated into three parts: but our ideas of $\frac{1}{100}$, $\frac{1}{1000}$, &c., clearly transcend the limits of distinct picturing.

Notions of Geometry, &c. This synthetic activity is illustrated in a somewhat different way in the formation of another class of notions. Our idea of a mathematical line, a circle, and so forth, does not exactly answer to any observable form. No straight line, for instance, discoverable in any actual object, perfectly answers to the geometric definition. Even

[1] This is borne out by the fact that some tribes, *e.g.*, those of Australia, signify 5 by the expression 'one hand,' and 10 by 'two hands'. It is also supported by the existence of the term digit and the form of the Roman numerals, I., II., &c. (For an interesting account of the origin and growth of our ideas of number, see the anonymous volume, *The Alternative* (Macmillan & Co.), Bk. I., Chap. XIX. The psychological process by which number-concepts are reached is described by Waitz, *Lehrbuch der Psychologie*, § 52, p. 599, &c.).

the most carefully drawn line would be found on closer inspection to deviate to some extent from the required type. It follows that these notions involve more than a simple process of abstraction, such as suffices, for example, for the detection of the quality colour or weight. They presuppose in addition to this a process of idealisation. The student of geometry in thinking about a perfectly straight line has to frame a conception of something to which certain actual forms only roughly approximate. The notion thus represents, like that of a large number, the result of a prolonged mental process which surpasses the limits of distinct imagination.

It is much the same with the notions smooth plane, perfect fluid, rigid body, &c., in physics. In framing these notions we are called on to modify, perfect, or idealise the results of abstraction, to form ideal notions which transcend the limits of distinct imagination, and yet which are definite enough for the purposes of scientific reasoning.[1]

The distinction between notions answering to pictures, and those which cannot be reduced to images is related to the difference between Symbolic and Intuitive knowledge. We have an intuitive knowledge of the number three, or of the figure triangle, because we can picture them. But we have only a symbolic knowledge of the number thousand, or of the figure chiliagon (one of a thousand sides). Leibniz, who emphasised the difference, adds that intuitive knowledge is more perfect than symbolic. This illustrates the importance of the function of imagination in relation to thought.[2]

[1] For a good account of these ideal notions see Taine, *On Intelligence*, Book IV., Ch. I., § II.

[2] For a brief account of the distinction see Jevons', *Elementary Lessons in Logic.* Lesson VII. Mansel argues that all general notions are an example of symbolic as distinguished from intuitive knowledge. (*Prolegomena Logica*, Chap. I., p. 26).

Conception and Discrimination. Notions are commonly said to be formed by attending to resemblances among things and passing over differences. Nevertheless in conception there is always a reference more or less explicit to differences. In forming the concept animal, for example, we are not only connecting many unlike things on the ground of their resemblances (animal structure and functions), but are marking these off from other things lacking these points of similarity (plants, and inanimate objects). When we think of European we are tacitly referring to non-Europeans (Asiatics, &c.). Indeed we cannot constitute a class by the presence of certain marks without at the same distinguishing it from other things wanting these marks. In all cases where there are well marked contraries or opposites, as heavy—light, sweet—bitter, good—bad, and so on, this process of discrimination becomes more explicit. To bring a thing under the conception light, is to set it over against the conception heavy. Thus while in conception assimilation is the main and prominent activity, discrimination still plays a subordinate part.

Systems of Notions: Classification and Division. The orderly systematic review of the agreements and the differences of things leads to what is called classification or division. To classify things is to view them in such a way that their different degrees of resemblance and difference may be clearly exhibited.[1]

[1] The reader must be careful not to be misled by the figure of speech, 'classing,' or 'arranging things in classes'. This is not a *material* process, bringing objects together in space. It is a *mental* process, a bringing of objects together in our thoughts, or a representing of them in their relations of similarity. To this it may be added that, owing not only to our limited

This takes place by proceeding through a series of gradations from notions of a low degree of generality to those of a higher degree. Thus supposing we have the concepts 'plough,' 'spade,' and so forth, we may group them under a more general head, 'agricultural implements'. With these we may take other things such as carpenters' 'tools,' 'surgical instruments,' 'machines,' &c., and bring them under a still more general head, 'instruments of labour'. Any lower class is called in relation to the higher class under which it is brought a species; and the higher class is called in relation to the lower a genus. In each step of this process we are *co-ordinating* or placing side by side certain lower classes or species differenced from one another by particular qualities (*e.g.*, surgical instruments, agricultural implements) and *subordinating* them under a larger class or genus.

In the upward movement from species to genera we continually discard differences (*e.g.*, surgical, agricultural use) and bring out a wider similarity (*e.g.*, quality of being an aid to labour of some sort). But we may set out with a large class, and by a downward movement break it up into successively smaller classes. For instance, given the class Art, we may break it up into the Useful and the Fine Arts: each of these classes, again, may be further broken up into sub-varieties. Thus, the Fine Arts may be mentally separated into those of the Eye (Painting, Sculp-

knowledge, but also to the very nature of conceptual representation, we never at any one time think of the range of objects included. As was pointed out above, the intelligent use of a general term implies not an actual reference at the time to the things denoted, but rather a readiness to apply it to things, as they present themselves.

ture, Architecture), and the Ear (Poetry and Music). This downward movement from the general to the particular is known as Division. It proceeds not by a gradual discarding of differences but by a gradual introduction of them, or what is called by logicians a process of 'determination'. Thus the notion Fine Art is further determined by the addition of the qualification visual, and so on. In this way the differences among things as well as their resemblances are brought into view.

It is evident that in the ascending stage of this operation we are performing a process of gradual analysis. That is to say, we are taking complex mental representations and singling out certain elements. On the other hand, in the descending stage (division) we are carrying out the supplementary process of gradual synthesis, combining new conceptual elements at each step, and so obtaining more complex representations. Here, then, again, we see illustrated the close connection between the two operations, analysis and synthesis.[1]

The most striking illustration of this orderly arrangement of notions is seen in the classifications of natural history, more particularly those of zoology and botany. But any general notion may thus be taken up into a system of notions. Thus our notion

[1] Some writers, as Sir W. Hamilton, point out that each stage of the process is at once analysis and synthesis. In the upward movement we separate qualities and combine things; in the descending movement we separate things and combine qualities (*Lectures on Logic*, XXIV., p. 5, &c.). But from a psychological point of view, which is concerned rather with the nature of the mental representations than with the range of objects represented, the process of analysis and synthesis referred to in the text is the more important.

of building, book, language, and so on, may be divided in a number of ways. Even the notions corresponding to abstract names admit of this orderly treatment. For example, we can classify the several sorts of colour, or of virtue. By thus taking up a notion into a system of notions, we bring into light its affinities and its oppositions, and prepare the way for a systematic presentation of knowledge respecting the corresponding things.

Imperfection and Perfection of Notions. Our notions are apt to be defective in a number of ways. There is much more reason for indistinctness in the case of notions than in that of percepts or of images. And, as in the case of these last, indistinctness is apt to lead on to positive inaccuracy. This special liability of concepts to remain defective or incomplete is connected with the very nature of the conceptual process, and with the fact that its results are embodied in language. It is possible to use words roughly for everyday purposes without any distinct notion of their purport. Many of the operations of reasoning can be carried on with only a momentary glance at the meaning of the terms employed. Hence the wide opening for vague concepts.

Many notions are thus defective from the first because the process of abstraction described above has not been perfectly carried out. And the fact that all of us form our notions to a large extent by attending to the way in which words are employed by others, renders us still more liable to entertain indistinct ideas about things. Hearing others apply the same word to things a child acquires a vague idea of some common feature or circumstance long before he can distinctly seize the true nature of the resemblance. Not only so, through the mere lapse of time words which once had a distinct meaning tend to drop this and to grow ill-defined and hazy in their signification. We have now to consider these defects, and the processes by which they are corrected.[1]

Distinctness of Concepts. By a distinct, clear, or well-defined concept is meant one in which the several features or characters forming the concept-elements are distinctly represented. Thus we have a distinct idea of metal or plant, when we clearly distinguish and seize together the several features of metals, or plants. On the other hand, an idea is indistinct, hazy, or ill-defined when the several characters of the objects are not thus distinctly represented.

Closely connected with the distinctness of a concept, as just defined, is its distinctness with respect to other concepts. By this is meant that the concept remains detached or distinguished from other and partially similar concepts with which it is liable to be confused. Thus we have a distinct idea of a nut when we distinguish the group of characters from those of an ordinary fruit; of a planet, when we distinguish the characters from those of a fixed star, &c. On the other hand a concept is indistinct or confused when it tends to amalgamate with a kindred concept. Thus our notion of limited monarchy is confused when it is

[1] The full investigation of this subject belongs to Logic which has to do with the regulation of the intellectual processes according to some objective standard of correctness. Still the psychologist may consider the mental processes by which such an adjustment to an objective standard is carried out.

apt to run into and be confused with that of absolute monarchy.

It is evident that in general these two kinds of distinctness will correspond one with another. In proportion as the concept characters are distinctly represented will it be distinguished as a whole from other concepts. Yet this correspondence is not as close as might at first appear.

We can best test the distinctness of a concept by our facility in applying the name or recognising a member of the class of things denoted. In general all want of distinctness, whether of the first or second kind, must tend to obstruct such application of names. Want of distinctness in the connotation leads to want of certainty with respect to the denotation. At the same time we are often able to name things readily with only imperfectly distinct concepts. Thus a child or an uneducated adult will (in many cases at least) at once recognise a fruit, and yet be unable perhaps to say what the constituent fruit-marks are. This suggests that a concept may be distinct in the second sense without being so *in the same degree* in the first. The complex of marks is represented with sufficient distinctness for keeping the name apart from other names and for applying it roughly to things; but there is no analysis of these into their constituent parts.

It may, perhaps, be said that in this case the concept is only nascent or imperfectly developed, being dependent on the presence of some corresponding percept with which it is involved. Just as many minds can (as we saw above) recognise an object presenting itself after a long interval, but cannot imagine it (with any degree of distinctness) during this interval, so they may be able to classify objects, and name one of a class when they meet with it, but not to represent the class in the absence of all of its members. It is plain, however, that where there is an absence of a full and distinct representation of the class-marks the capability of recognising members of the class, and of readily applying the name, must be limited.

Distinctness and Clearness of Concepts. Some writers have distinguished between the two kinds of distinctness just indicated in the following way: A notion is *clear* when we can recognise the corresponding things: *obscure* when we cannot do this. It is *distinct* when the several parts or elements are distinctly represented: *indistinct* or *confused* when this is not the case.[1]

It would, however, be better to reverse this and call a notion distinct when it is distinguished as a whole from other notions, and clear when its parts or details are clearly represented. This, as Locke suggests, would correspond more closely with the primary use of the words as employed about objects of sight.[2] It is evident, however, from the almost perfect interchangeableness of the words in ordinary speech, that the distinction here drawn is of little practical moment. In general the two kinds of distinctions increase (or decrease) together.

Causes of Indistinctness of Concepts. The imperfections just spoken of may arise from either of the causes stated above. Many notions are indistinct from the first because the percepts and images are so; or because the process of abstraction has never been carried far enough to bring into distinct relief the

[1] This is the distinction drawn by Leibniz and adopted by Sir W. Hamilton. (See the latter's *Lectures on Logic*, IX.)

[2] Compare what was said above (p. 228) respecting images. Locke's view may be gathered from the following quotations:—"The perception of the mind being most aptly explained by words relating to the sight, we shall best understand what is meant by 'clear' and 'obscure' in our ideas, by reflecting on what we call 'clear' and 'obscure' in the objects of sight. Light being that which discovers to us visible objects, we give the name of 'obscure' to that which is not placed in a light sufficient to discover minutely to us the figure and colours which are observable in it, and which in a better light would be discernible." Again, "As a clear idea is that whereof the mind has such a full and evident perception as it does receive from an outward object operating duly on a well-disposed organ, so a distinct idea is that wherein the mind perceives a difference from all others, and a confused idea is such an one as is not sufficiently distinguishable from another from which it ought to be different".—*Essay on the Human Understanding*, Bk. II., Chap. XXIX., Sect. I., &c.

common characters of a class of things. This last remark applies with special force to the notions of the young and uneducated, who can in most cases distinguish different kinds of objects sufficiently for practical purposes by the aid of general names, but who have not carefully reflected on the content of their notions.

But again, our notions are apt to become indistinct (in both senses) from the lapse of time, and the imperfections of memory. As we have seen above, a concept is held together as an organic unity by the conjoint attachment of a number of images to one and the same word. Hence it may become dissolved or disintegrated by the weakening of the bond of association. Some or all of the images are loosened from their verbal attachment and disappear, and thus the notion fades for want of the imaginative root. Or if the images remain, they are not firmly united to the verbal symbol, but become in a measure detached one from another, presenting themselves as a series of images rather than a welded mass of images. Hence the representation of the common characters, that is to say the notion, grows blurred and ill-defined: the notional features no longer stand out in well-defined relief. In this manner the concept tends by the lapse of time to return to its early crude state of a string of images, or an imperfectly combined mass of images.[1]

[1] We often find ourselves in this state of mind with respect to names the meaning of which we learnt when young, but which we have since had but little occasion to use, *e.g.*, those of Roman or Greek officials, and technical names in science. The word calls up the images of one or two of the more striking examples or specimens, but with only the dimmest discernment of the common characters.

It is to be added that this indistinctness of concepts with the lapse of time is greatly favoured by the very nature of language, the subtleties which are a necessary part of a developed language, as well the imperfections from which the best language is not free. Every language aims at expressing all distinctions of thought. Hence the existence of many words whose meanings overlap, or answer to finely distinguishable aspects of the same things or relations among things. Instance the terms, nation, society. The obtuse mind unable to draw such distinctions naturally attaches hazy ideas to the terms. There is probably a vague sense of some difference, but this is not rendered clear to the mind.

Not only so, the imperfections of language, its defects and redundancies, promote indistinctness of conception. The ambiguity of terms, the fact that one word expresses a variety of shades of meaning, often distinguishable only with great difficulty, has been commonly recognised by thinkers as one of the most fertile sources of vague and ill-defined notions. To this it must be added that the redundancies of language, the fact that two words are (commonly at least) employed as synonyms without any appreciable difference of meaning, is unfavourable to distinctness. In this case the same notion has to attach itself to two unlike symbols, the unlikeness of which necessarily suggests that there must be a difference of meaning between them.[1]

[1] On the ambiguity of language and the indistinctness of thought connected with this, see Locke, *Essay on the Human Understanding*, Bk. III., Chap. IX.; J. S. Mill, *System of Logic*, Bk. IV., Chaps. IV.—VI.

Accuracy and Inaccuracy of Concepts. As in the case of images, so here we have to distinguish between the mere indistinctness of a concept, and its positive inaccuracy. A distinct notion depends on our clearly representing the marks we take up into our notion: an accurate notion depends on our taking up the right elements. By this is meant that we include the common characters of the class, or more exactly, all those included in the current meaning of the word, and no others. Or, to express the same thing in different language, an accurate concept is such that the word in which it is embodied will cover or stand for all the things commonly denoted by that name, and for no others.

This suffices for an ordinary definition of accuracy. It is evident, however, that there is implied here a double reference, namely, to the qualities which things actually have, and to those which they are commonly regarded as having. In the case of the large majority of men, and of all young persons, it is sufficient that their notions correspond to the common notions. The correctness of their ideas will be judged by their conformity to the fixed usages of speech. On the other hand, it is given to a few individuals to seek, by a fuller and more exact knowledge of things, to improve on this fixed usage of words, and to bring the commonly accepted notions into closer conformity to things. Such a person sets up a higher and ideal standard of accuracy by which he aims at rectifying the common one.

Inaccuracy of conception, like mere indistinctness, may arise either through an imperfect performance of the initial processes of comparison and abstraction, including the discrimination of one group of things from another; or through a subsequent process of conceptual dissolution or disintegration.

(A) Inaccurate Notions depending on Imperfect Abstraction. To begin with, then, a notion may be inaccurate because the process of abstraction or notion-formation is incomplete. The first notions of all of us are rough and inexact, answering to a process of comparative inspection which is imperfectly followed out. Owing to these imperfections, the notions are inaccurate; that is to say, the range of the name is not coextensive with that of the things commonly or properly denoted by it, but covers a smaller, or a larger group. In the first case we may call the notion too narrow, in the second, too wide.

Notions which are too Narrow. In the first place, a notion may be formed on too narrow an observation of things, the consequence of which is that accidental features not shared in by all members of the class are taken up into the meaning of the word as a part of its essential import. For example, a child that has only seen red roses is apt to regard redness as a part of the meaning of rose. Similarly an uneducated Englishman is apt to think of government as implying the existence of a monarch. Such notions are too narrow.

Notions which are too Wide. In the second place, a notion may be inaccurate by being too wide. If the observation of things is superficial and hasty only a part of the common traits or marks are embodied in the name. The notions of children and of the uneducated are apt to be too wide. They pick up a part, but only a part, of the significance of the words they hear employed. Thus they observe among different fish the conspicuous circumstance that they live in the water, and so they are disposed to call seals, dolphins, and so on, fish. In a similar way a child will call all meals 'tea,' overlooking the fact that 'tea' connotes besides the characters of 'meal,' that of taking place towards the close of the day.

(B) **Inaccurate Notions depending on Loss of Elements.** While notions may thus be inaccurate at the outset owing to defective observation, they tend still further to become so by the lapse of time and the gradual obliteration of the conceptual elements. Every successive loss of such concept-elements plainly involves a discrepancy between the name and the things denoted. In other words the concept grows too wide. As names are emptied of their full significance they thus become too inclusive. Thus by forgetting that the term 'selfish' means what is done with a conscious reference to self, or knowingly for the advantage or good of self, some writers have tended to make the term cover all actions, benevolent as well as others. Not only so, this decay of the conceptual organism leads on to the coalescence of one concept with another, and the consequent erroneous confusion of the corresponding names. The first elements of meaning to disappear from a word are the less prominent features which serve to give it its precise shade of meaning, and to mark it off from other and related words. The loss of these obviously leads to the complete confusion of the connected words. Thus it would be easy to confuse the meanings of the expressions, 'a benevolent act,' and a 'beneficent act,' by dropping in the former case the representation of the internal factor of good-will or kindly intention.[1]

[1] On the nature of confusion of ideas see Locke, *Essay on the Human Understanding*, Book II., Chap. XXIX., Sect. 6.

It is evident from this brief reference to the sources of inaccuracy in notions, that this defect is very closely connected in its origin with the other defect, indistinctness. Where there is want of definiteness and of sharp discrimination of the notion from other notions, there are the circumstances favourable to inaccuracy. The notion which is hazy and confused in the sense that it is only vaguely differenced from another is likely pretty soon to be 'confused' with it in the full sense, that the boundary-line is lost sight of altogether.

It is interesting to compare the changes marking the history of words and concepts in the individual mind, with those changes which characterise the history of them in a community. What is known as 'generalisation' or the widening of the meaning of terms corresponds with the extension of the range of words described above, and may be said, like it, to involve a certain forgetfulness. On the other hand there is the process of 'specialisation,' by which new marks are added, and the range of the denotation consequently narrowed. To this there answers in the case of the individual, the gradual, and often unconscious incorporation of the results of accidental individual experience.[1]

Revision of Notions. It follows from the above that perfect concepts commonly presuppose not one process of comparison and abstraction simply, but a succession of conceptual processes, by the aid of which the first crude concepts are perfected, and also the tendencies in words to lose their significance are counteracted. Defective conception at the outset (whether ending in a vague or a positively erroneous notion) can only be made good by more searching inspection of the things submitted to examination,

[1] On the changes marking the use of words in the history of a community see Trench, *On the Study of Words;* J. S. Mill, *System of Logic,* Book IV., Chap. V.

and also by a wider and more varied observation of objects in their similarities and dissimilarities.

Not only so, even when the concepts have been properly formed they can only be kept distinct, and consequently accurate, by going back again and again to the concrete objects out of which they have in a manner been extracted. Only when we do this shall we avoid the error of taking empty names for realities, and keep our representations fresh and vivid. Conception is in this way continually renewed by contact with actual concrete fact by way of perception and imagination. The frequent application of names to individual things is thus a condition of preserving vitality in our concepts. Thinking is not the same thing as imagining, yet it is based on it and cannot safely be divorced from it. Clear concepts imply images of particular objects in the back-ground, ready to come into the full light of consciousness as occasion requires. We only attach a definite meaning to a name when we are in a position to recall a concrete example, or rather a variety of concrete examples.

Relation of Conception to Imagination. The above remarks help to bring out still more distinctly the relation between imagination and thought. As we have seen, a notion differs from an image in that it contains a representation of common features only; and not of individual peculiarities. When a word tends strongly to call up an image of a concrete object, rather than a notion of a class, the processes of thought are obstructed. The highly imaginative mind which instantly reduces a word-symbol to some concrete instance is heavily handicapped in following out trains of abstract thought.[1] The many interesting accompaniments of the individual things interfere with the grasping of their general aspects.

At the same time, notions are formed *out of* images. Thinking is thus based on imagination (both reproductive and constructive). The meaning or content of a word is wholly derived from the inspection of concrete things. Hence a notion in order to be full, distinct, and stable must be continually supported by images. To every word there ought to correspond several tendencies to form images; though since the images are often very different, these tendencies should in general counteract one another.[2] Only when there is this vital connection between thought and imagination can the mind steer clear of the perils of empty words.

On Defining Notions. Our notions are rendered distinct and accurate not merely by going back to concrete facts or examples but by a number of supple-

[1] This is of course generally the case with the young and the uneducated. The narrowness of their experience, and the feebleness of their powers of abstraction, cause words to be pictorial, descriptive of concrete individuals rather than symbolically representative of classes. This tendency is amusingly illustrated by Mr. Galton. Some one began narrating: 'I am going to tell you about a boat'. A young lady of an imaginative turn being asked what the word 'boat' called up answered "a rather large boat, pushing off from the shore, full of ladies and gentlemen". (*Inquiries into Human Faculty*, p. 110).

[2] This close connection between the notion or typical image, and the particular images out of which it is developed, is seen in the readiness of these to arise when we dwell on the meaning of a word. In all such cases we have, as M. Taine observes, a shifting image, or succession of images, each imperfect but tending to grow complete. (*On Intelligence*, Pt. I., Bk. I., Chap. II., II.). The fact is also seen in the rapidity with which the mind in realising a verbal description reduces a concept, by the aid of the suggestions of the context, to a distinct image.

mentary processes which may be roughly grouped under the head of definition. To define a word in the logical sense is to unfold its connotation, to enumerate more or less completely the several characters or attributes which make up its meaning. As we have seen, we form many concepts such as 'metal,' 'man,' 'civilised country,' before we are able to represent distinctly the several attributes which compose the connotation of the words. It is only when the mind's power of abstraction increases that this higher stage of analysis becomes possible. When it has been performed the mind will be able to retain the essentials of the concept by means of the verbal definition. When for example the child has learnt that glass is a transparent substance, composed of certain materials, brittle, easily fused by heat, a bad conductor of heat, and so on, the string of properties stored up by aid of the verbal memory will serve to give distinctness to the concept.[1]

A second and subordinate part of this process of definition of names consists in the discrimination of the notion from other notions. The precise meaning of a word is only brought out by setting the notion over against its opposite or contrast, and by discriminating it from nearly allied notions. Thus for example the notion 'wise' is elucidated by contrasting it with 'foolish' and by distinguishing it from allied notions as 'learned'.

[1] This applies to composite notions only, that is to say to such as involve a number of common traits. It is to be added that many classes of things possess so many attributes that an exhaustive examination is impossible. We are content to specify the most important characters of 'iron,' 'fish,' and so forth.

Finally our notions may be defined or rendered more sharp in outline by a reference to a classification of things. Logicians say that the best way to define a class name (especially when the qualities are too numerous, and many of them too imperfectly known, for us to enumerate them completely) is to name the higher class, or 'genus,' and add the 'difference,' that is the leading features which mark off the class from co-ordinate classes. Thus we may define a parallelogram by saying that it is a four-sided figure (higher class) having its opposite sides parallel (difference). Such a definition serves to fix in the mind some of the more important marks of the objects, and to keep the concept distinct from other concepts (*e.g.*, those of other four-sided figures). In a manner, too, dividing a term, or pointing out the sub-classes composing the class of things denoted, serves to clear up or define our notions. Since a concept is formed by means of an inspection of things, an occasional reference to the whole extent of things covered by a name helps to give definiteness to the concept. Thus in teaching a child the meaning of a term like metal, it is well to connect it in his mind with all the principal or more familiar varieties. In fact the two processes here touched on, bringing out the connotation (logical 'definition'), and exposing the denotation (logical 'division'), are mutually complementary.

Other Results of Abstraction: Idea of Self. The same process of abstraction whereby the child learns to group external objects according to their resemblances enables him to ascertain the nature of the inner world, his own mind. His idea of self begins, as we have seen, with the perception of his own organism as the object in which he localises his various feelings of pleasure and pain. Even this partial idea is slowly acquired. As Prof. Preyer points out, the infant does not at first know his own organism as something related to his feelings of pleasure and pain. When more than a year old his boy bit his own arm just as though it had been a foreign object.[1] This stage of self-representation seems to correspond roughly at least to the early period of life in which the child speaks of himself by his proper name. That is to say, the child does not as yet set himself in opposition to all outer objects, including all other persons, but regards himself as one among many objects.

As the power of abstraction grows this idea of self becomes fuller and includes the representation of internal mental states. The child does not at first reflect or turn his attention inwards on his own feelings. He is glad or sorrowful, but as soon as the momentary feeling is over he is apt to forget all about it. His attention is absorbed in outward things. To attend to the facts of the inner life implies an effort, an active withdrawal of the mind from the outer world. This only occurs later on, and first of all probably in connection with the development of certain feelings. Thus, his nascent emotion of pride in doing things, in bringing about changes in his little world, would aid in the development of a consciousness of self: and this result would be furthered by rivalries with others and the attendant feelings of

[1] *Die Seele des Kindes*, p. 360.

triumph, &c. The influence of others, too, would aid greatly in the growth of this fuller idea of self. More particularly, perhaps, its development would be promoted by the experience of moral discipline and the reception of blame or praise. It is when the child's attention is driven inwards in an act of reflection on his own actions as springing from good or bad motives, that he wakes up to a fuller consciousness of himself.[1] The gradual substitution for the proper name of 'me,' 'I,' 'my,' which is observable in the third year probably marks the date of a more distinct reflection on internal feelings, and consequently of a clearer idea of the mental self.

A further process of abstraction is implied in arriving at the idea of a *permanent* self, now the recipient of impressions from without, now the subject of feelings of pleasure and pain, hopes and fears, and now the cause of outward actions. The image of the enduring and always present object, the bodily self, undoubtedly contributes an important element to this idea. But this supplies only the more concrete or pictorial part of the representation. The highly abstract idea of an enduring mental self, one and the same through all the changes of feeling, involves a certain development of memory and the power of retracing in its main features the series of past personal experiences (see p. 264). The idea is formed by turning away the attention from the endless diversities of this chain of experiences and fixing it on

[1] Of course the social environment plays an important part in aiding the growth of self-consciousness by its modes of speech. The relation of self and not self, including that between the I and the You, is continually being pressed on the child's attention by the language of others.

the common underlying circumstance, that they are all parts of one connected whole, links in one continuous chain of mental events.[1]

Our Notions of Others. In one sense the individual self stands in contrast to all outer things, including other persons. The child distinguishes the 'I' from the 'you'. At the same time the knowledge of self underlies and leads on to the knowledge of others as something more than material objects perceived by the senses, as beings endowed with feelings, desires, thoughts, &c.

There seems to be an instinctive tendency to endow other human beings with life and consciousness. As we shall see by and by, children appear to interpret roughly the signs of others' feelings, such as the smile, before individual experience could have led them to connect, by way of their own experience of like feelings, these signs with their proper significates. Not only so, there is some reason to suppose that the child at first tends to attribute life, feeling, and intention to all outer objects which in any way simulate the appearance of human form and movement.[2] This personifying of objects around him is based on his knowledge of his own double existence, bodily and mental.

[1] For a fuller account of the growth of the idea of self the reader may consult M. Taine's work *On Intelligence*, Pt. II., Bk. III.; and my volume, *Illusions*, Chap. X., p. 285, &c. The German reader should consult Lotze, *Med. Psychologie*, § 37 *seq.*; and Waitz, *Lehrbuch der Psychologie*, § 58.

[2] This has been questioned, but seems to be borne out by the observation of children's way of speaking about things. Among many cases one could instance is the following. A little girl of 5 once said to her mother, "Ma, I do think this hoop must be alive, it is so sensible, it goes wherever I want it to".

As intelligence grows and he reflects more distinctly on his own feelings, wishes and aims, he learns to attribute definite feelings and thoughts to others when the corresponding external signs are present. Later on he projects a persistent conscious self behind the bodily framework answering to his first idea of his mother, his brother, &c., fashioned after the model of his own self. A still higher exercise of abstraction leads on to the formation of notions of different kinds of persons, wise, kind, good, and so on. In this way he reaches general notions of men based on their mental traits, their dispositions and characters.

Growth of Conceptual Power. As we have seen, the power by which the mind frames general notions is merely an expansion of powers which show themselves in a germinal form in the earlier intellectual processes of perception. The essential mental process is seizing similarity in the midst of diversity. This the child does in the first year of life. To recognise the mother's voice, for example, as one and the same amid all the changes of loudness and softness, and all the variations of pitch, clearly implies a certain rudimentary power of abstraction.

Early Notions. The gradual development of the power of comprehending things or classes, or of forming general notions is one of the most interesting phases in the mental history of the individual. By a careful observation of children at the time when they begin to understand and use words we may learn much as to the way in which this power grows.

In studying this phase of intellectual progress we must be on our guard against a source of error. As has been pointed out before, children do not learn to speak as the race may be supposed to have acquired language, that is to say inventing new names to express the similarities of things which they first notice. The child finds a language ready made for him, and through the force of imitation and the need of making himself understood, he is impelled to adopt the signs employed by others. Now it would be absurd to suppose that when he first understands and reproduces a name he attaches to this sign the same general meaning that adults attach to it. Such names as 'puss,' 'bow-wow,' and so on, when first used have not the full force of general signs, but represent particular individuals. The growth of the conceptual power at this early stage is best illustrated perhaps by means of the child's own unaided extensions of the application of words to new cases.

As might be expected, the first notions to be formed correspond to narrow classes of objects having a number of striking points of resemblance; and, further, to those varieties of things which have a special interest for the child. Thus he readily recognises particular objects of diet, as milk and pudding. In like manner he soon learns to assimilate certain kinds of toy as tops, and other objects having well-marked resemblances, as watches and clocks. For the same reason, he at once extends the term 'bow-wow' or 'puss' to a number of dogs or cats, and the name 'papa' to other male adults.

Growth of Conception and of Discrimination. It is to be noted that the child's concepts grow in clearness and definiteness with the power of noting differences as well as likenesses. At first there seems to be no clear discrimination of classes from individuals. The name is used for a number of objects as seen to be alike, but, so far as we can see, without any clear apprehension whether they are the same thing or different things. This is probably true of the extension of the word papa to other men besides the father. The concept becomes definite just in proportion as differences are recognised and the images of individual objects, this and that person, this and that dog, and so on, acquire separateness in the mind. This same circumstance explains another fact, namely, that the child often uses the names of genera (if not too large classes) before those of species. Thus he lumps together animals resembling dogs as goats, under the name 'bow-wow'.[1] In like manner he will apply a word like apple to fruit generally or a variety of fruits as apple, pear, orange, &c. Similarly, he will understand in a rough way the meaning of the word flower before he comprehends the names 'daisy,' or 'rose'.

Formation of more Abstract Conceptions. A higher step is taken when the child forms classes founded on a single property. The first examples of this higher power of abstraction occur very early in relation to aspects of objects of great interest to him. He first displays a considerable power of generalisation in

[1] See M. Taine's article, *On the Acquisition of Language by Children*, in *Mind*, Vol. II. (1877), p. 255. It is possible indeed that a child has a vague notion corresponding to animal (namely, something which moves about and makes a noise) before he distinguishes classes of animal. Thus M. Perez (in his work, *Les trois premières années de l'enfant*, Chap. XII.), says that an infant gave out a sound 'appa' accompanied by signs of longing when different animals, as a kitten, a chick, and a small bird, were brought near it.

grouping together edible things. Mr. Darwin in his interesting account of the early mental development of one of his children tells us that when just a year old he invented the word 'mum' to denote different kinds of food. He then went on to distinguish varieties of food by some qualifying adjunct. Thus sugar was 'shu-mum'.[1] Attention to common visual features comes later. A little boy known to the present writer when in his eighteenth month extended the word 'ball' to bubbles which he noticed on the surface of a glass of beer. This implied the power of abstracting from colour and size and attending to the globular form.

As experience widens and the power of abstraction strengthens less conspicuous and more subtle points of agreement are seized. Children often perplex their elders with their use of words just because the latter cannot seize the analogy between things or events which the young mind detects.[2] By degrees the young mind advances to the formation of more abstract ideas. One of the earliest of these is that of disappearance, or the state of being absent, commonly expressed by the sign 'ta-ta' or some similar expression.[3]

[1] See his article, 'Biographical Sketch of an Infant' in *Mind*, July, 1877 (Vol. II.); *cf.*, M. Taine's account of a little girl's first generalisation of sweet things under the name cola (chocolate) in the same volume of *Mind*, p. 256. See also M. Taine's work, *On Intelligence*, Vol. II., Book IV., Ch. I., § I., Par. II.

[2] For example a child of two and a half years seeing a number of fowls perched in a row on a fence, said, 'They are having tea'. He had associated the idea of sitting in a row with sitting up at table.

[3] Prof. Preyer (*Die Seele des Kindes*, p. 295) says his boy reached this notion of disappearance by the fifteenth month. The boy known to the writer certainly used the sound ta-ta or *á ò* (all gone) for signifying the disappearance, as well as the absence of a thing when he was sixteen months old.

Use of Adjectives. A distinct progress in the conceptual power of the child is seen when objects come to be qualified by the use of adjectives. A child will from the first stage of speech pick up and use a few adjectives, such as 'hot,' and 'nice'. In these cases the qualities answer to simple sensations of very great interest to him. A more difficult achievement is seizing the meaning of a relative epithet such as 'big'. The boy already referred to first employed this word when he was nearly 22 months old. He saw a rook flying over his head, and called out 'Big bird'.

Among these more abstract conceptions reached in this early period of life those of number and time deserve a passing notice. Prof. Preyer says that his boy in his 26th month had not the remotest idea of number. Another boy, already referred to, when 22 months old distinguished one object from a plurality of objects, and this was long before he could distinguish two from three, and so on.[1] In like manner he marked off all periods of the past under the head of 'yesterday,' and all periods of the future under the head of 'morrow' or 'by and by'. A considerable advance in intelligence (including observation, &c.), is necessary before the child passes from this rough discrimination of one and many to the recognition of particular numbers; and from a mere discrimination between

[1] He called any number of objects (besides one) 'two, three, four,' according to the formula taught him by his mother. M. Perez (*Les trois premières années de l'enfant*, Chap. XIII.) tells us that this corresponds to an animal's distinction of number. A cat with only one kitten left it out of a number was miserable: but when 2 were left it out of 5 it was contented. It thus distinguished between one and many.

past and future to the recognition of definite divisions of time, as yesterday, to-morrow, last week, next week.

Period of Fuller Development. The power of abstraction, of analysing things and discovering their common aspects, qualities and relations, only attains a considerable strength in the stage of youth as distinguished from that of childhood. The earlier period is pre-eminently that of concrete knowledge. During this time the number of concepts formed is comparatively small, and these are such as involve the presence of numerous or obvious resemblances. But from about the fourteenth year onwards a marked increase in the power of abstraction is observable. In cases where the powers of observation and of imagination have been properly cultivated we may notice at this stage a strong disposition to view things under their common aspects. The language becomes more general and more abstract.

How Progress in Conceptual Power is to be Measured. This advance may be measured in different ways. As the power of abstraction grows, particular impressions and observations are brought more and more under general heads. Again it is noticeable that concepts on the same level of generality are framed with greater and greater facility. Less time and effort are needed to form a new notion. Once more, the concepts reached show a higher degree ot generality and are more abstract in character. The use of such words as 'action,' 'life,' 'idea,' marks a considerable step onward. The most exact way of measuring progress is by noting the degree of remoteness of the concepts attained from the concrete experiences of everyday life. The progress of conceptual power is also marked by a growth of distinctness in the concepts formed, a greater facility in defining the terms used, and in distinguishing them from other terms with which they are apt to be confused.

Varieties of Conceptual Power. Individuals differ considerably in their power of abstraction. Some minds are much quicker in seeing similarity amid diversity, in mentally separating the common aspects of individual objects. These differences turn mainly on inequalities of the assimilative power of the mind. They appear to imply, too, differences in the power of controlling the attention, of resolutely turning the mind away from individual differences and fixing it on what is common to many instances.[1]

These differences commonly show themselves with respect to various kinds of subject-matter, such as the ideas of number, space, physical processes, and so on. Good abstractive power shows itself in a superior readiness to frame any kind of concept. At the same time we find with these general inequalities more special differences. Thus one student will show a fairly good power of abstraction with reference to physical processes and agencies, or to the ideal notions of mathematics, and yet be comparatively wanting in the power of thinking about subjective mental states. Contrariwise there may be a specially good power of

[1] It is probable that some minds are more interested in differences and more ready to note them, while others are more attracted by similarities and more ready to detect them.

abstraction in the latter direction with a decided deficiency in the former.

These differences, again, clearly depend in part on native differences. Children are not endowed at the outset with the same degree of assimilative power. Moreover the peculiar constitution or cast of the mind may give a natural bent to one kind of conception. Thus other things being equal a boy with a fine eye for form will show a good conceptual power in geometry, while another with great muscular activity and a strong bent towards practical contrivance will naturally occupy himself in forming notions about nature's processes, the notions with which mechanics specially deals. At the same time the degree of power of abstraction attained generally or in any special direction turns to a considerable extent on the amount of exercise, training, or culture undergone. Speaking roughly we may say that the educated youth is most clearly marked off from the uneducated by the possession of a large stock of general notions and a facility in seizing the common aspects of the things about him. And it is no less manifest that special devotion to any branch of study, as mathematics, will in average cases result in a marked increase in a special conceptual aptitude in this particular region.

Training of Power of Abstraction. The problem of exercising the power of abstraction and generalisation is attended with peculiar difficulties. Children, it is commonly said, delight in the concrete, and find abstraction arduous and distasteful. Nevertheless it is certain that the young are much given to discovering resemblances among things and to a certain kind of generalisation. There is indeed a distinct intellectual satisfaction in discovering similarities among things. A young child's face may be seen to brighten up on newly discovering some point of similarity.[1] And to some extent this pleasure may be utilised in training the child's powers. His lack of interest in generalities is often due to the fact that his mind is not supplied with the necessary concrete examples out of which the notions have to be formed.[2]

The training of the conceptual power should begin in connection with sense-observation. Objects should be laid in juxtaposition, and the child invited to discover their similarities of form, &c. And here his active impulses may be appealed to, by giving him a confused multitude of objects and inviting him to sort them into classes. By such a direct inspection of a number of examples together notions of simple classes of natural objects, as species of animal and flowers, as well as of geometric forms and numbers may be gained. The process of generalising may be still further aided by a judicious selection of particulars for inspection. It is well, as a rule, to set out with good average specimens of the class, in which the common characters are conspicuous and not disguised by striking individual peculiarities of colour, &c. These would serve as typical specimens. After this, extreme instances may be introduced. A sufficient variety of instances must be supplied in every case, but the number required will differ according to the character of the notion to be formed.[3] Throughout this process of calling into play the power of abstraction the teacher should seek to combine the exercise of discrimination with that of assimilation. He should invite the child to contrast one chemical substance, one class of plants or animals with another. The essential marks of a triangle are brought out by juxtaposition with quadrangles, &c. This operation of comparing and classing should be supplemented

[1] *E.g.*, when a boy (26 months old) watching a dog panting after a run, exclaimed with evident pleasure, 'Dat like a puff puff' (locomotive).

[2] "There is nothing the human mind grasps with more delight than generalisation or classification, when it has already made an accumulation of particulars; but nothing from which it turns with more repugnance in its previous state of inanition."—*Isaac Taylor.*

[3] As Dr. Bain points out, a child may obtain a notion of a single property as weight by the aid of one or two instances only, whereas he requires a good many examples of the classes metal, plant, &c. (*Education as a Science*, Chap. VII., p. 197).

by naming the objects thus grouped together, and pointing out in the form of a definition the more important of the traits they have in common.[1]

In these exercises of the conceptual power the mother or teacher must be satisfied in the first instance with the discovery of the more prominent points of likeness among the things examined, and the naming of these. It would be absurd for example to expect a child at the outset to point out all the structural differences which characterise a particular species of plant. The definitions must gradually increase in fulness and precision as the power of abstraction grows.

The special difficulty in this branch of intellectual training arises in connection with the formation of these notions which cannot be reached by direct inspection of objects. The child is continually hearing words which he does not understand. Many of these lie out of his reach, and it is well to let him know it. But all instruction involves the unfolding of the meaning of general terms. In the most elementary lesson in geography or history general terms are necessarily employed. Here the learner will be called on to perform a process of synthesis, to recombine the results of abstraction practised on objects of direct personal observation. His success will depend on the degree of perfection of these first efforts, as well as on the force of his imagination.

There is perhaps no part of intellectual training which requires so much careful attention as the control of the child's use of words. It is vain to expect him from the first to seize the exact meaning of all the terms which he employs. He must discourse with others, and the improvement of his conceptions progresses partly in connection with his employment of words. On the other hand, the mind is only too prone to be satisfied with loose and vague notions about things, and this intellectual indolence is the most fatal obstacle to clear and accurate knowledge. The dangers can only be averted by seeking to form in the pupil's mind from the outset a habit of making his notions as clear and distinct as pos-

[1] It is evident that this exercise of the child's powers of comparing different objects with a view to classification should arise naturally, and by insensible gradations, out of the earlier exercise of inspecting single objects already illustrated (p. 217).

sible. He should be exercised from the first in explaining the words he employs. It is a good rule never to let a child employ any word without attaching some intelligible meaning to it. He should be questioned as to his meaning, and prove himself able to give concrete instances or examples of the notion, and (where possible) to define his term roughly at least. The meaning which he attaches to the word may be far from accurate to begin with. But the teacher may be satisfied with a rough approximation to accuracy as long as the meaning is definite and clear to the child's mind. As knowledge widens the teacher should take pains to supplement and correct these first crude notions, substituting exact for rough and inexact definitions. At the same time he should aim at giving greater precision to the pupil's notions by encouraging him in the discrimination of closely allied words, including proximate synonyms.

The problem when to take up the subjects requiring a considerable measure of the power of abstraction, such as the physical sciences, grammar, and so on, is one of the most perplexing ones in the art of education. It is probable that individuals differ so much in respect of the rapidity of this side of intellectual development that no universal rule can be laid down. What is certain is that subjects which mainly appeal to the memory and imagination like geography and history should precede these which make a large demand on the powers of abstraction and generalisation. There is a psychological error in attempting to teach the generalities of grammar before the mind has been well stored with particulars. It is probable that even the rudimentary branches of mathematics, namely arithmetic and geometry, though deriving so much aid from sense-intuition, are apt to be begun too soon for the most economic management of brain-power. But in the case of arithmetic at least the recognition of the paramount utility of the study is likely to override purely theoretical considerations.

APPENDIX.

On the nature of abstraction and the formation of concepts, see Sir W. Hamilton, *Lectures on Metaphysics*, Lect. XXXIV.; Prof. Bain, *Mental Science*, Book II., Chap. V.; M. Taine, *On Intelligence*, Part II., Book IV.; and Lotze, *Logic*, Book I., Chap. I. For an account of the early development of the generalising power the student may consult the articles already referred to in *Mind* (1877) by Mr. Darwin and M. Taine. The work of Prof. Preyer, *Die Seele des Kindes* (3ter Theil) gives a very full account of lingual progress during the first three years. *Cf. Les trois premières années de l'enfant*, par Bernard Perez, Ch. XII.

On the practical side of the subject the reader would do well to read Locke's valuable chapters on the Imperfection and Abuse of Words, *Essay*, Book III., Chap. IX.-XI. The difficulties of exercising the powers of abstraction and the best means of alleviating these are well dealt with by Dr. Bain, *Education as a Science*, Ch. VII., pp. 191-197. The German reader should also consult Beneke, *op. cit.*, §§ 26-38. In connection with this subject the teacher should read those chapters in Logic which deal with terms and their distinctions, and with division and definition (*e.g.*, Jevons, *Elementary Lessons in Logic*, III.—V. and XII.).

CHAPTER X

JUDGMENT AND REASONING.

Higher Stage of Thinking: Judging and Reasoning. Thinking as we have seen includes besides Conception, or the process of forming concepts, the operations commonly marked off as judging and reasoning. Having a concept we may go on to apply this to some individual thing or class of things, as when we decide that a particular piece of stone is granite, or that diamonds are combustible. We are then said to judge. And having framed given judgments we may pass from these to other judgments, as when we conclude that air has weight because all material substances have weight. We are then said to reason. These two remaining processes of thinking, which are closely connected one with the other, are to be the subject of the present chapter.

Judgment Defined. In everyday discourse the word judge is used to express the process of coming to a decision about a thing, when we do not reason out a conclusion explicitly or formally, but apply in a rapid and automatic manner the results of past experience to a new case. Thus we judge that a man is sincere or insincere, that a plan is good or bad, and so forth.[1]

[1] This at least is the more common meaning. The term is used too for the process of forming an opinion as to the rightness of conduct, or the beauty of

In Mental Science we greatly extend the application of the term. Whenever we connect two representations one with another under the form of a statement we perform an act of judgment. It does not matter by what mental process we reach the assertion, whether directly by observation, as when we say 'This rose is blighted,' or by a process of inference, as when we conclude from certain signs in the sky that it is going to rain.[1]

Judgment and Proposition. The result of an act of judgment is a verbal statement or proposition. The connection between judging and asserting in words is quite as close as that between forming a concept and naming. An infant or an intelligent brute may probably form a few rudimentary judgments (*e.g.*, I am going to be fed) without language. But in later life we rarely if ever judge without making a verbal statement or proposition externally or internally. Every proposition is made up of two principal parts: (1) the subject or the name of that about which something is asserted, (2) the predicate, or the name of that which is asserted. Thus when we affirm 'This knife is blunt,' we affirm or predicate the fact of being blunt of a certain subject, namely 'This knife'. Similarly when we say 'Air corrodes,' we assert or predicate the power of corroding of the subject 'air'.

As just suggested, there are many implicit judgments where there is

an object by referring it to some standard for comparison. The expression is one of great ambiguity, and consequently not easily susceptible of exact definition. See Prof. Bain's *Education as a Science*, Chap. IV., p. 122.

[1] The term judgment has been extended to the simplest intellectual acts of sense discrimination. (See Stumpf, *Tonpsychologie*, Theil I., Absch. I.)

no statement. This applies to acts of perception and recollection. The child's first exclamation on seeing a large object, 'big,' may be said to imply the statement 'That is a big object'. So in recalling an event we implicitly affirm the occurrence of the event at a particular time. The close association of thought and language makes it difficult for us to form an idea of these unworded judgments.

Judgments about Individuals and Classes. It is evident from these examples that the predicate of a judgment is always some general notion.[1] On the other hand, the subject may be either a "singular notion," *i.e.*, the representation of some one individual thing,[2] or a general notion about a class of things. Thus I can assert something about a particular flower, or a particular man, as when I say 'This flower is faded'; 'John Smith is an industrious man'. These are known as Singular Judgments. They are the first to be formed by the child, and constitute a very important step in the development of thought.

In addition to these Singular Judgments we have what are known as Universal Judgments, that is to say, statements about classes. The propositions 'Laurels are evergreens,' 'Wise men are not dogmatic,' are such general or universal statements.[2] These Universal Judgments stand in much the same relation to the others as general names to names of individuals (proper names). They gather up in a succinct form

[1] The apparent exceptions to this statement, as when both subject and predicate are proper names, *e.g.*, "Tully is Cicero," need not concern us here.

[2] On the difference between merely imagining an object, and thinking of it as a thing or substance, see Lotze, *Logic*, Sect. 26.

[3] The student will notice the difference between the psychological and logical treatment of judgments. The logician commonly groups singular judgments with universal, marking both off from particular statements (made about some or a part of a class). The psychologist sets singular judgments in direct contrast to universal.

our knowledge respecting an indefinite number of in vidual objects.

Judging, a Process of Synthesis. To judge is to connect or combine two representations (of individuals or classes) one with another. When for example we judge that a particular person A. B. is untruthful, we combine the idea or notion 'untruthful' with our representation of A. B. Similarly when we judge that iron is a conductor of heat, we connect the notion 'conductor of heat' with the notion 'iron'. More particularly, we add or append the notion answering to the predicate to the notion answering to the subject. An act of judgment may thus be described as a process of synthesis by which we connect two conceptions one with another.[1]

Since all ideas are representative of things (real or imaginary), in connecting two representations in the form of a judgment, we are plainly representing the things as conjoined or connected with, or related to, one another. Thus in judging that iron is a conductor of heat, we are representing this metal as possessing the quality or power affirmed of it.

Judgment and Conception. As has been pointed out, a judgment differs in form from a concept. And we are now able to see more clearly wherein the difference consists. In conception there is, as we saw, a process of combining. Thus the concept 'iron' is formed by mentally grouping together a number of properties, as a certain weight, degree of hardness

[1] If the conceptions answer to things conjoined or given together in experience, the process of synthesis takes a lower form than it assumes when the mind first brings them together, as in drawing a conclusion or framing a hypothesis.

or impenetrability, &c. But in this case the various elements combined fall together in one complex representation. The mind here comprehends the several qualities as together comprising one thing or substance. In judgment, on the other hand, we distinctly set forth two representations as two, keeping them apart from one another, while at the same time we connect them one with another. We think of certain objects or qualities as distinct, and at the same time explicitly view them as related. Thus in affirming that iron is a good conductor of heat, we think of the quality ot conducting heat as something apart from the iron, something new which in the act of affirming we add to it. In other words, we represent iron in a special relation to this quality, as the subject of it, or the substance in which it inheres.

At the same time, as hinted above, there is a close connection between the processes of conception and judgment. Concepts are formed by means of a succession of judgments. In mentally bringing objects together on the ground of their likeness we 'judge' them to be similar. So, too, in separating things on the ground of their dissimilarity. Not only so, our concepts are built up gradually, by successively discovering new points of likeness among things. Thus a child after knowing the more obvious properties of iron, as its colour, weight, and hardness, finds out less conspicuous properties, as that it is softened by great heat. And every such addition to his knowledge about iron takes the form of a judgment. To the iron as he has known it he now appends the new feature or property, setting forth the result of this process in the statement 'Iron is softened by heat'. In this way each successive development, or stage of development, of a concept is brought about by the aid of a process of judgment; while in its turn this fuller concept becomes an element or constituent in later judgments.

Synthetic and Analytic Judgments. Logicians distinguish between judgments which combine with the subject a new idea, as 'iron rusts,' and those which simply unfold a part of what was contained in the subject, that is to say, a part of the connotation of the term, as 'iron is heavy'. The first are called synthetic judgments (or real propositions), the second analytic judgments (or verbal propositions). Definitions are thus analytic judgments. This distinction answers to that drawn above between the concept and the judgment. We may by an act of special attention single out some property or element of a complex concept and set it forth (formally) as a judgment. But the characteristics of a judgment proper, a connection of representations previously distinguished, and the representation of a corresponding relation between the things, are here wanting. There is not the reality but only the appearance of a process of judging in this case.

This distinction is a logical one, drawn for the purpose of guiding our processes of thought according to a normal or common standard. It assumes that we all know the full meaning of terms, and use them in the same sense, that is, give them the same connotation. The psychologist, however, is interested in the growth of knowledge in the individual mind. Hence it is of immediate importance to him to distinguish between analytical and synthetical judgments as determined by the individual's previous knowledge. As observed above, we find out the properties of things gradually, and each successive discovery leads to a judgment which is based on an act of synthesis. Thus, in the instance given, the child is really adding a new element to his concept iron. On the other hand, after discovering a new property in a thing we tend to take this up into our notion of that thing, even though it may not be a part of the meaning of the term as commonly understood. And this being so, it may be said that when afterwards we have occasion to explicitly assert it, we are virtually analysing a complex mental representation. Hence one may say that all our judgments are at first synthetic, though they tend to become analytic as our knowledge of things is perfected.[1]

[1] The difference in the logical and the psychological treatment of analytical and synthetical judgments is well brought out by Volkmann, *Lehrbuch der Psychologie*, Vol. II., Section VII. B, § 121.

Judgment and Belief. If we look at the process of judging a little more closely we shall see that it is accompanied by the mental state known as belief. As was pointed out above, in connecting two representations we are representing the corresponding things as connected with, or related to, one another. And this representation or apprehension of a relation between things involves belief. When I represent iron as capable of being softened by heat, I believe in its possessing this property. A mere joining of two representations cannot constitute an act of judgment if this element of belief is wanting. When, for example, in a state of idle reverie there is a chaotic conflux of ideas, there is no belief attending the momentary combinations. We only believe when we look on our ideas on their objective or representative side, that is to say, view them as representative of real things, and make some relation between the things the object or matter of distinct thought.[1]

The nature of an act of judgment can hardly be understood completely without some reference to the question what it is that constitutes the object of belief, that we specially represent or think about in the act of judging. Taking as an example of the common form of judgment, 'Water is a compound substance,' it would appear that what the mind grasps or apprehends is the relation of a substance or thing of a certain kind (water), to a quality which appertains to, or inheres in, it (composite character). At the same time, as we saw above, we cannot view a thing as possessing a quality without more or less distinctly bringing it into relation to other things which share in this quality. Hence it may be said that another relation thought of and affirmed (though in

[1] Some thinkers describe the process of judgment as having to do exclusively with a comparison of the mind's ideas. But this view of the process overlooks one of its main ingredients, viz., the state of belief (see J. S. Mill's *Examination of Sir W. Hamilton's Philosophy*, Chap. XVIII., p. 403, &c.).

most cases much less distinctly) is one of similarity between the thing water and the other things known to be compounds.[1]

Nature of Belief. The precise psychological nature of belief is a problem of some uncertainty. This is seen in the fact that different writers have referred it to different regions of mental phenomena. Most appear to regard it as an intellectual state: yet some (*e.g.* Hume) have spoken of it as a feeling or emotion, while others have connected it very closely with the active side of mind. Belief is clearly intellectual inasmuch as it enters as an essential ingredient into our processes of knowing. At the same time, it has a certain emotional complexion. To believe, to be sure about anything, implies a characteristic state of feeling, as contrasted with that which attends the opposite mental condition of doubt, to be spoken of presently. Finally it is evident that there is, generally speaking, a close relation between belief and activity. As we saw in a preceding chapter, expectation, which is one of the simplest forms of belief, involves a readiness to act. Yet while the state of belief is thus closely related to other mental states, it cannot be analysed into these. It seems to be a perfectly simple mental state, having a unique character of its own.[2]

While belief is thus a unique mental state, it varies much in character according to the nature of the object believed, and the attendant mental feelings. Belief in a good (hope) is different from belief in an evil (fear). Belief in a matter which has no direct bearing on our action, as a piece of political news or a new fact of science, differs from belief in the efficacy of some agency which we may be called on to test. Our belief in our own powers of doing things is a different mental state from our trust in another's abilities. As we saw above (p. 253), there is a well-marked difference in the character of our memories and expectations. It has been argued that all our assertions respecting the enduring relations of objects, and all our universal judgments, are resolvable into expectations (with a ground-work of memory). Thus our belief that water is a compound substance may be said to be the assurance that we should find any speciman of water with which we chose to experiment resolvable into elements. This view of the exact object of belief in universal

[1] We are apt to speak of the verbal statement itself as the object of belief; but our belief in a proposition is a belief in its truth, that is its correspondence with the actual relation of things. The relation is not in all cases one of substance to its qualities; it may be one of similarity, cause and effect, &c. For a fuller account of the objects of belief, the reader is referred to J. S. Mill's *System of Logic*, Book I., Chap. V.

[2] For a fuller consideration of the nature of belief, the reader is referred to my volume, *Sensation and Intuition*, Chap. IV., p. 75 &c. *Cf.* Dr. Bain's work, *The Emotions and the Will*, 3rd edition, Belief, p. 505 &c. The way in which belief is influenced or determined by intellectual and other causes will be spoken of presently.

truths would seem to follow from the doctrine expounded above, that in using a general term we are regarding it as standing for an indefinite number of objects which we do not separately image at the moment.[1] Supposing this to be so, however, it is evident that the indefiniteness of the expectations in this case affects the character of the mental state. There is an absence of that activity of mind which we found to accompany an expectation of some concrete fact in the immediate future.

Affirmation and Negation. Judgment begins in affirmation, in combining two representations and in deciding that there is a connection between the corresponding things. But all our judgments are not affirmative. We deny as well as affirm. We declare that things are not, as well as that they are. Negation presupposes affirmation. To say 'It is not going to rain' implies that the corresponding affirmation ('It is going to rain') has actually been made by somebody, or has somehow been proposed or suggested to the mind (*e.g.*, by a question 'Is it going to rain?'). Negation is the rejection of an affirmation as untrue or false. Our minds refuse to perform the process of synthesis required. Now since every statement that is made must be either true or false, it follows that our minds (if they decide at all) are shut up to a choice between an affirmation and a negation. For example we have to say: Either this is a real diamond or a spurious one: Either this boy is guilty or is not guilty, that is, innocent. Hence an act of judgment (when its meaning is made explicit) is a choice; it is a deciding between two alternatives, and so resembles the decision of a judge.

[1] This is the doctrine of belief developed by J. S. Mill. See his edition of James Mill's *Analysis of the Human Mind*, Vol. I., Chap. XI., note (p. 402).

So far as judgment is concerned about the similarities of things, affirmation answers to a process of assimilation, and negation to one of discrimination. Thus when in classifying animals we affirm that a lion is a quadruped, and that a whale is not a fish, we assimilate in the first case and discriminate in the second. Resemblance is thus the positive aspect of objects, it is that by which we bring them together mentally. Difference, on the other hand, is the negative aspect, inasmuch as it serves not to conjoin, but to separate things.

Belief and Disbelief. Belief and disbelief with respect to the same statement obviously exclude one another. If I believe that A. B. is guilty I cannot at the same time disbelieve it, that is, believe that he is innocent. It is to be observed, however, that belief in a statement implies disbelief *with respect to the opposite statement.* If I believe that A. B. is innocent I disbelieve any assertion of his guilt. If I accept the statement, 'all men are fallible' I (implicitly or explicitly) reject the statement, 'some men are infallible'. Belief and disbelief are thus intimately associated and may be described as the same attitude of mind in relation to two conflicting or contradictory statements.[1]

Belief and Doubt. So far, it has been assumed that the mind either accepts or rejects a statement, that it must come to some decision about the matter. But this is not the only alternative. We may waver between acceptance and rejection, and suspend our judgment. This is a state of doubt.[2] Thus I may feel altogether uncertain whether it is going to rain or not, and so cannot be said to form any judgment about the matter. The state of mind is the opposite of that called belief. When we believe in a thing our minds are at rest, and we are in a state of readiness to act. When we doubt our minds are pulled in two directions, there is a sense

[1] In connection with the subject of affirmation and negation the student should read some text book in logic respecting the nature of opposition among propositions, paying particular heed to the distinction between two contradictory and two contrary statements. The double aspect of every statement, as affirming and at the same time denying, is well brought out by Prof. Bain in his doctrine of Obversion. See *Logic* (Deduction), Chap. III., § 27.

[2] The etymology of the word *(dubio,* from *duo, cf.* German *zweifeln,* from *zwei)* suggests this oscillation of mind between two conflicting alternatives.

of conflict or discord, and action is impossible. Doubt is thus a more complex state than belief, and shows itself much later in the history of the child. Children have many confident expectations about things (*e.g.*, 'I am going to have dinner,' 'I am going out for a walk,' and so on) before they take up the cautious attitude of doubt. This last state of mind arises, as we shall see presently, only when experiences have multiplied.

Degrees of Belief. Doubt implies a tendency of the mind towards and away from a given act of judgment. The two opposing forces may exist in very different proportions. Hence a scale of degrees of doubt and belief. At one end we have perfect confidence in a statement:[1] doubt is wholly excluded. Then comes a series of gradations of belief in which the repulsive force increases in strength till it may exactly equal the other. This is a state of perfect doubt or equilibrium of contending forces. Then follows a lower series of gradations in which the tendency to reject is stronger than the tendency to accept. Finally there is the lowest level, answering to absolute rejection or disbelief, at which the repulsive force completely overpowers the attractive force.

Sources of Belief. Our beliefs, and along with these our doubts, are products, having their conditions. We cannot at will bring any two ideas together in the mind and entertain belief or doubt respecting the corresponding external relations. We say that our belief has been generated or produced in a certain way, as by observation of facts, reasoning, tradition, &c. It is only when certain antecedent conditions are fulfilled that any two representations come together in the particular way which involves an act of belief. In other words, certain psychical

[1] This seems to be the state of mind required in a jury before convicting a man of a crime.

forces are necessary to bind the representations together in that synthesis which, as we have seen, underlies an act of judgment or belief. The psychologist seeks to group these conditions or sources of belief under the most general heads.

(1) **Experience and Association.** The most obvious condition or generative antecedent of belief is experience. The combination of presentations in our experience determines, as we saw above, the association of representations. And the force which commonly determines the combination of representations in the act of judgment is this force of association. This was illustrated in the simplest types of belief, memory and expectation. In both cases the belief is determined by the order of experiences.

Speaking generally, we may say that the strength of belief varies as the degree of associative force at work. Thus our expectations are strong when the corresponding conjunctions of experience are very numerous, as in expecting to see a body fall when support is withdrawn. On the other hand, when experiences vary, and the associative forces are consequently feeble, we find a modified belief or a state of doubt. One set of suggestions competes with another, and in consequence, the tendency to belief is checked or crossed by another tendency. Doubt first springs up in these circumstances. Thus a boy that is sometimes taken out by his mother in her walks, sometimes not, is in a state of doubt when he next sees her dressed for a walk.[1]

[1] For a fuller account of the way in which early belief is checked, see my volume, *Sensation and Intuition*, Chap. IV., p. 92.

It has been said that a number of conjunctions of experience is not a prerequisite of firm belief. A single experience, if of an impressive kind, produces a great strength of belief which is not proportionately (if at all) increased by subsequent repetitions.[1] If only all the suggestive force is one way, it seems to matter little whether it represents a large or a small number of experiences. Yet since repetition is a general condition of an enduring association, it seems to be commonly involved in belief. The importance of a number of conjunctions comes into view where experiences are no longer uniform. In this case it is the *proportion* of experiences pointing one way to those pointing another way which determines the state of belief or doubt.

(2) **Verbal Suggestion.** Experience is not the only agency which effects a combination of representations in the form of a judgment. Other influences play a considerable subordinate part in generating and moulding belief. Of these the most important is verbal suggestion. The close connection between the act of belief and its expression in a verbal statement or proposition has already been pointed out. The proposition is the external embodiment of the internal belief. Hence the closest possible association between the two. Hence, further, the tendency to accept another's statement quite apart from any process of 'weighing testimony' The combination of words strongly excites in the hearer's or reader's mind the combination of ideas and a nascent belief in the corresponding connection of things. We see this in the permanent acceptance of traditional statements, and in the momentary tendency to believe even an extravagant assertion. It is seen too in the reflex effect of our own utterances. As Hartley has observed, a person

[1] Dr. Bain recognises a primitive tendency to belief (apart from experience and association) under the title 'Primitive Credulity,' see *The Emotions and the Will*, 'Belief,' § 7 and following.

by the mere act of repeating a story which he does not at first credit comes in time to believe in it.[1]

(3) **Effect of Feeling.** Once more, our beliefs are greatly influenced by our feelings and wishes. As was pointed out when dealing with the influence of feeling on imagination, emotional excitement gives greater vividness to the images called up, and determines the order of their combination. By bringing together ideas and dwelling on them under the sway of strong feeling, the mind tends strongly to believe in the corresponding realities. This is seen in the strength of belief attaching to the wild dreams of youth. Commonly, of course, the combination has some support in the order of experience. What the feeling does is to keep a certain suggestion or class of suggestions before the mind, and to exclude others which, but for the feeling, would be much more powerful than the first. This is the state of mind known as bias or prejudice, in which strong likings, wishes, &c., interrupt the due sequences of thought. Belief in tradition is greatly supported by the sentiment of authority.

Belief and Activity. As was remarked just now, belief and activity are closely related. To begin with, belief is clearly an antecedent of intelligent action. In order to aim at a purpose or result, we must discern a connection between the means employed and the result. Not only so, to believe is, in many cases at least, to be prepared to act. Belief is commonly, perhaps, accompanied by a more or less distinct reference to a possible need of acting.

[1] *Observations on Man*, Pt. I., Chap. III., Sec. 4, p. 390.

Yet while belief is thus in a manner prior to action, implying a reference to future action, it is in another way a product of activity. Strong active impulse, leading to great eagerness to act, promotes the believing, as contrasted with the doubting, state of mind. As will be shown more fully by and by, belief, in the form of a confidence in the result of action, is the characteristic of youth with its strong desires and active impulses. Doubt and hesitation, on the other hand, presuppose a curbing of these impulses by the lessons of experience. The contrast which thus shows itself in the case of eager youth and cautious age, discloses itself in a less marked way in the case of the practical and the speculative mind. The former, strongly impelled to act and therefore to decide somehow, is impatient of that state of uncertainty which with the speculative mind is a very common one.

It follows that belief and activity react on one another. Strong conviction favours action, and on the other hand, a strong desire to act predisposes the mind to decision. It is often difficult to say which is cause and which is effect. Thus it is difficult to determine how far the confidence of youth is the result of ignorance or rather of uniformity of experience and suggestion, and to this extent a condition of its active eagerness ; and how far it is the outcome of the strong active impulses themselves. Belief appears to stand in a relation to vividness of imagination. It has been said that any vivid representation, however incongruous with the order of experience, tends to excite belief. The effect of vividness is seen in the immediate suggestions of actual presentations. The expectation of an immediate consequent of a present impression, *e.g.*, the appearance of the moon from behind a cloud when the edge grows bright, is stronger than the expectation of a more remote consequent. The influence of feeling on belief seems, too, to be explained in part by the added vividness given to the representations called up.[1]

[1] On the dependence of belief on imagination see Dugald Stewart, *Elements of the Philosophy of the Human Mind*, Part I., Chap. III. (Conception), p.

Degree of Perfection of Judgments: Clearness. Our judgments, like our notions, have different degrees of imperfection or perfection. Of these perfections the first is clearness. By this is meant that the concepts combined in the judgment be distinct, and that the relations involved be distinctly apprehended. Want of distinctness in terms leads to indefiniteness in statement. The judgment, 'Penuriousness is a vice,' has just as much clearness as belongs to the ideas 'penuriousness' and 'vice'. Not only so, a judgment cannot be clear unless the mind discerns all that is immediately implied in the assertion, the equivalence of the assertion to other verbally unlike statements, and its incompatibility with other contradictory statements.

Judgments tend to be indistinct in a number of ways. A common source of indefiniteness is imperfect observation, which may give rise to the apprehension of some relation of things though the exact nature of this relation is not made clear to the mind. Thus we often note a connection between facts but have not gone far enough to ascertain *how* they are connected, which is the dependent one, and so forth. Again, defects of memory by leading to indistinct reproduction are a great obstacle to clearness of judgment. If the mind fails to recall the exact qualities of things, it will be incapable of making definite asser-

149: Taine, *On Intelligence*, Part I., Book II., Chap. I., Sect. III.: *cf.* my volume, *Sensation and Intuition*, Chap. IV., p. 83, and following. The effect of vividness in an image seems to be to generate an expectation of speedy realisation. Whether this should be called a stronger belief than an undoubting confidence in a more remote realisation, may, perhaps, be questioned.

tions about them. As in the case of concepts, so in that of judgments, what was once clear may become hazy or indefinite by the impoverishment of words. Truths at first clearly apprehended may in time by repetition and habit pass into lifeless formulæ, in which there is no clear apprehension of the contents, and no vivid belief. As a last source of indistinctness may be mentioned the intrusion of feeling into the intellectual domain. Strong feeling is incompatible with careful observation, fine discrimination of ideas, &c. Judgments passed under the influence of strong emotion are in general characterised by vagueness.

One source of indistinctness of judgment calls for special notice. We saw how the notions of the young tend to be indistinct owing to the fact that they acquire them by attending to the words of others. In a like manner, want of clearness in judgment arises to a considerable extent through the adoption of beliefs or opinions from others. It is obvious that each of us acquires a large part of his knowledge from others by way of tradition and instruction. This transmission of the accumulated knowledge of many generations to each individual, though a vast benefit, is at the same time productive of a habit of vague judgment. The powerful tendency of the mind to believe what is asserted by another leads us to adopt statements hastily without any close inspection of the underlying truths. We are apt to don the opinions of others as we don their fashion of dress. In all such cases there is no full exercise of judgment on our part. The opinions adopted are not taken into the mind, the ideas fully grasped, and the relations asserted distinctly apprehended.

Accuracy of Judgment. Again, our judgments, like our notions, may be accurate or inaccurate. An accurate judgment is one which corresponds precisely to the realities represented, or which faithfully expresses the relations of things. Want of clearness in judging leads on naturally to looseness of judgment. Propositions which are not clearly understood tend to be *mis*understood. Positive inaccuracy arises from a number of causes. Some of these are similar to those which produce indistinctness of judgment. Thus it is obvious that when observation is defective, or when facts are not accurately recalled, there will be room for inaccuracy. Again, it is evident that strong feeling may produce not only indistinctness but positive inaccuracy. The tendency to exaggerate what has been seen or heard illustrates this effect. The influence of the active impulses in sustaining a foolish belief in our own powers, in the efficiency of the agencies at our command, illustrates another and somewhat analogous effect of deflection of judgment from the standard of accuracy.

In addition to these sources of inaccuracy, we have to recognise the imperfections and limitations of each individual's experience. Our judgments are the outcome of our special type of experience, our individual associations. Accuracy of judgment thus presupposes the interaction of the individual and the social intelligence, the continual correction of the 'personal equation' in judgment due to accidents of temperament, experience, ruling associations, by reference to the standard of common or average experience.[1]

Other qualities of Judgment: Promptness, Stability, &c. Besides these merits and defects which belong to judgments viewed in themselves there are others which refer to the way in which they are formed and adhered to. These qualities serve greatly to determine the degree of excellence we attribute to a person's faculty of judgment.

To begin with, the act of judging plainly involves a readiness to decide on a matter. A certain degree of promptness in decision is thus a condition of judgment. A mind drawn hither and thither by conflicting tendencies and unable to master these, is weak in judgment. On the other hand, there is the opposite fault of impulsiveness or rashness, that is to say, an overeagerness in coming to a decision, accompanied by an impatience of the delay involved in reflecting, weighing evidence, &c. A good judgment combines promptness with deliberateness. This quality will be illustrated more fully by and by in connection with practical decision.

Just as judgments are excellent or otherwise in respect of their mode of formation, so they are meritorious or defective in respect of their persistence when formed. A judgment when arrived at tends to persist. It is only by this tendency to persistence that consistency among judgments is possible. To assert one thing to-day and another thing to-morrow shows great weakness of the faculty of judgment. On the other hand, our judgments are liable to be

[1] See my volume, *Illusions*, Chap. XI., p. 324, and following.

modified by new influences, whether new facts of experience, or new processes of reflection. If firmness of judgment is a merit, obstinacy is clearly a defect. The first condition of mental growth is that we keep our minds open to new impressions. Hence we should be ready to weigh new evidence when it presents itself, and to modify our opinions. Excellence of judgment in this respect lies between two extremes of instability and obstinacy

Closely related to the quality of stability is that of independence. When there is no strong individual opinion, the mind is at the mercy of the social surroundings of the time. On the other hand, a disregard of the beliefs of others is the mark of an obstinate and intractable intelligence. Here, again, excellence of judgment lies between two extremes. A sound judgment combines a measure of intellectual independence with a due regard for the claims of others' convictions.

Enough has been said to illustrate the truth that a sound judgment presupposes a combination of many conditions. An act of judgment is the outcome of our whole experience, and involves the processes of observation, reproduction, comparison. &c. It is only when these processes are perfectly performed that the judgment will be free from imperfections. A sound judgment implies, too, a considerable development of the power of controlling the thoughts and the feelings, of fixing the mind on the matter in hand, and of resisting the forces of bias.

Relation of Individual to Social Intelligence. It is seen from the above that the relation of the individual to the social intelligence is a complex one. On the one hand, the individual depends on the community (and the race) for a large part of its knowledge. To set at nought the carefully garnered intellectual products of many generations would be only worthy of an insane man. The influence of the social intelligence in supplementing and correcting private belief is an incalculable benefit. On the other hand, the individual may fall in too readily with accepted opinions. The assertion of individual opinion is implied in a full exercise of the faculty of judgment. Not only so, the current beliefs of any age cannot be regarded as final. The growth of knowledge means the continual modification of common ideas respecting nature, human life, &c. Hence an undue pressure of the social on the individual mind is not only injurious to the latter, but may retard the extension of the common stock of ideas. The problem of the adjustment of private to public belief, of avoiding anything like unhealthy or abnormal eccentricity of judgment on the one hand, and yet of permitting the full exercise of a sound individuality, is a particularly difficult one.

Relation of Processes of Judging and Reasoning. Hitherto we have been considering judgments, so far as this was possible, without any reference to the question whether we reach them directly without any process of inference from previous judgments, or indirectly by way of such a process. This distinction is a much more important one from a logical, than it is from a psychological point of view. For as we shall see, many judgments which can be grounded on other judgments are not in the first place reached by way of these as their psychical antecedents. Nevertheless, the difference does roughly answer to a psychological distinction. For whenever inference precedes judgment, the psychical process is a more complex one, and the belief finally adopted differs to this extent that it is consciously based or grounded on other beliefs.

Intuitive and Reasoned Judgments. Many of our judgments are arrived at intuitively or immediately, and apart from a process of reasoning or inference. If this were not so, there would be no starting-points for us to reason from, no nails from which our chains of argument could be suspended. Such judgments may be called intuitive. Many of our Singular Judgments are plainly of this kind. All assertions which gather up the results of observation and memory, as for example 'This stone is lustrous,' 'I met A. B. yesterday,' are intuitive. They involve, in ordinary cases at least, no process of inference.

Range of Intuitive Belief. The question as to the exact range of immediate or intuitive beliefs is one of considerable difficulty, and has constituted one of the main disputes in philosophy. Many thinkers hold that there are certain universal beliefs which are wholly independent of experience, and not reached by any process of inference. Such are the first principles of the mathematical sciences, *e.g.*, 'Things equal to the same thing are equal to one another,' and the great principles underlying the physical sciences, 'Nature is uniform,' 'Every event has its conditions or cause'. Such directly apprehended truths have been variously named Intuitions of Reason, Necessary Forms of Intelligence, Principles of Common Sense, &c. On the other hand, an opposite school asserts that these beliefs, though in the mature mind they assume the appearance of intuitions, have in reality been derived from innumerable facts of experience. They are thus inferences from experience, though of such a simple kind, and answering to such a wide range of facts, that the mind reached them too early for us to recall the process of inference. Finally, the evolutionist seeks to mediate between these opposed views by means of the doctrine that beliefs derived from innumerable experiences of our ancestors are transmitted to us in the form of inherited intellectual tendencies.[1]

Common Sense. Without going into the philosophical question as to the ultimate source and ground of validity of these self-evident principles, we may note the psychological fact that many of the apparently self-evident judgments of mature life were in the first instance reached by a process of rough, informal inference. It follows, indeed, from the

[1] On the nature of such transmitted intellectual dispositions, see above, p. 61. For a brief historical account of the controversy respecting the origin and source of validity of these beliefs, see Dr. Bain's *Mental and Moral Science*, Appendix B.

psychological theory of judgment that any belief which has become firmly established in the mind should in time acquire the appearance of an independent or self-sufficient belief. We forget its history and its antecedents, and tend to regard it as something original and underived. This applies to that stock of common uninvestigated belief, with reference more particularly to matters of practical interest, which makes up a chief part of what ordinary people appear to mean by 'Common Sense'. Each of us reaches these beliefs partly by way of personal observation, and so by a rough kind of inductive reasoning, partly through the promptings of instinctive impulse and feeling, but largely through the powerful forces of tradition. The belief that life is a good thing, or that men know their own interest best, illustrates such a seemingly original self-sufficient belief. To question the validity of these beliefs is regarded as a sign of a degree of mental eccentricity that verges on insanity. This mass of self-assertive common-sense belief is thus one of the principal forces of the social intelligence which, as we saw just now, tend to control and mould the individual mind. More especially it acts as a check to the reasoning impulse discouraging all investigation into the grounds of the principles, postulates, assumptions on which our everyday judgments seem to rest.[1]

On the other hand, it is evident that a large remainder of our judgments both singular and universal are reached by a process of reasoning or inference. By this is meant that we derive the judgment as a conclusion from previously gained judgments which in relation to the last are called premises. Thus in asserting that it is going to rain because the barometer is falling, or that all diamonds are combustible because this, that, and the other diamond have been burnt, or that philosophers are fallible because all men are fallible, we are said to infer or draw a conclusion. All conclusions may be called reasoned judgments.

[1] For an account of the meanings of 'Common Sense' in everyday life and in philosophy, see Hamilton's Edition of Reid's Works, Note A. The nature of Common Sense is discussed by Dr. Carpenter, *Mental Physiology*, Bk. II., Chap. XI., who brings out clearly the co-operation of hereditary influences with those of personal experiences. The tendency of derived beliefs to simulate the appearance of primary ones is dealt with in the author's work on *Illusions*, Chap. XI.

There is much the same relation of reciprocal dependence between judgment and reasoning as between conception and judgment. Our judgments are in many cases reached by a process of reasoning more or less perfectly developed. And all judgments thus reached are capable of becoming starting points or premises in further processes of reasoning.

Nature of Reasoning. To reason is, as we have seen, to pass from a certain judgment or certain judgments to a new one. This implies that the mind accepts the conclusion on the ground of the premises. In other words, the resulting belief is in this case due to a recognition of the relation between the new and the old judgments, of the fact that the premises carry with them or necessitate the conclusion, or that the latter follows from the former. What, it may be asked, is the essential intellectual process here? What relation does the mind detect between premise and conclusion in thus passing from a belief in the one to a belief in the other?

In order to ascertain this, let us take a simple example of reasoning: 'The barometer is falling, therefore it is going to rain'. In drawing this conclusion we identify the present state of the barometer with past states which we have observed or heard about But we do not simply identify this phenomenon as an isolated fact: we identify it in respect of its accompaniments or attendant circumstances (altered state of the atmosphere, and results of this, rain). From this it appears that reasoning is only a higher and more complex process of assimilation, identification, or classing. It differs from perception (the recognition of a single object), and from conception (the assimilation of many objects) inasmuch as it is the assimilation of things in their connection with certain other things, or, briefly, the identification of relations among things.

We thus see that reasoning proceeds by way of assimilation. We only reason in so far as we note the resemblances among objects and events. Discrimination enters into reasoning, but not as the uniting binding link between the old and the new judgment. From mere difference we can infer nothing. This is seen plainly enough in mathematical reasoning. If we know that A and B are both unequal to a third quantity C, we are not able to pronounce any relation between A and B.

At the same time, discrimination plays a subordinate part in reasoning. The power of reasoning, of connecting one judgment with another, implies the ability to detect similarity. What we commonly mean by a dull stupid mind is one that cannot reason, and cannot follow a process of reasoning, that fails to assimilate, to seize the bond of similarity which ties together premise and conclusion. On the other hand, a confused mind is one that is apt to reason badly by not discriminating, by supposing similarity to exist where it does not. Our reasoning is only accurate in so far as we distinguish as well as assimilate.

Inference and Proof. While we thus assume that in reasoning the mind consciously passes from premise to conclusion, we must remember that this does not answer to the actual order of mental events in many, and perhaps, the majority of cases. The conclusion presents itself first, and the ground, premise, or reason, when it distinctly arises in the mind at all, recurs rather as an after-thought, and by the suggestive force of the similarity between the new case and the old. In the case just instanced, the mind passes at once to the conclusion (here an expectation). It does not distinctly recall the past instances at first, and may not do so at all unless when the conclusion is challenged or doubt somehow suggested. The distinct reference to the antecedent judgment is thus rather a part of the final revisional process of *proof*, than of the first process of inference. Here again we must be on our guard against taking the logician's account of how our processes of thought may be carried on as representing faithfully the manner in which they actually take place in ordinary cases.[1]

Implicit Reasoning. This operation of passing from one or more judgments to another may assume one of two well-marked forms. In the first place we may pass directly from one or more singular judgments to another singular judgment without clearly setting forth to ourselves or to others the ground of our conclusion under the form of a general truth or principle. Thus a boy having observed on one or more past occasions that particular pieces of wood float in water will conclude directly in a new instance that this piece of wood will float. This has been called reasoning from particulars. It may also be called implicit reasoning, because the general ground or principle is implied and not explicitly set before the mind.

[1] On the nature of such inference, see Stumpf, *Tonpsychologie*, § 5, pp. 89, 90; *cf.* A. Sidgwick, *Fallacies*, Part I., Chap. I., Sect. I.

Here, again, it is to be observed that there need be no conscious reference to the past instances. Thus the boy's mind passes directly from the perception of the piece of wood to the idea of its floating. As we saw when dealing with expectation, the mind is determined by the forces of association to pass directly to an anticipation of an event without any conscious reference to the past experiences which form the groundwork of the association. Indeed, when the past experiences are very numerous, any distinct representation of them is obviously precluded.

This form of reasoning is the simplest and earliest in the order of development. What germ of reasoning the lower animals possess shows itself under this form. The reasonings of children are of this kind too. They pass from old experiences, some or all of which are more or less distinctly recalled according to circumstances, to new ones without seizing the general rule or principle involved in their procedure. And even adults in the large majority of cases reason in the same way. In matters of everyday experience, even when general assertions are available, we do not, in ordinary cases, consciously go back to them. And in not a few cases, *e.g.*, in reasoning as to the motives or reasons of other persons' conduct, we should find it very hard to connect the conclusions reached with any such universal judgments.

Practical Judgment, Tact, &c. This kind of reasoning may be described as unconscious, or better, as automatic. There is no distinct record of past instances from which the mind sets out. Numerous past experiences have left their accumulated traces in the shape of tendencies to judge in a certain way. There is something here in the region of intellect analogous to habit in the region of action. Just as in the case of a habitual or 'automatic' action we tend to do something without antecedently forming a clear representation of an end or purpose, so in the case of automatic inference we tend to pass to a conclusion without previously representing the ground or starting point. It is probable that in each case the result is largely dependent on firmly established nervous connections. How little conscious reference there is to previous knowledge in these cases is seen in the familiar fact that many persons who can (in most cases) reach sound conclusions are quite unable afterwards to justify them. Not only have they no guiding general principles, they have not a full mental retention of the facts which when clearly set forth would supply the starting point, or point of analogy. This applies with especial force to conclusions formed about practical matters. A man of 'practical judgment' is one who can rapidly adapt the aggregate results of his past experiences in this automatic way to new cases. Joseph Hume, a man of this sort, often resorted to for his valuable advice, was accustomed to say "Such is my opinion but I cannot tell you how I arrived at it".[1] What is meant by quick intuitive insight into others feelings or character, tact in dealing with persons, presence of mind in quickly adapting actions to unforeseen circumstances, all illustrate the operation of such automatic intellectual tendencies in slightly different forms. In each of these highly useful qualities we have the effect of numerous past experiences and observations no longer individually recoverable but associated in an indissoluble psychical product, a firmly fixed tendency to judge in a certain way under a particular class of circumstances.[2]

The tendency of the mind thus to reason directly from one particular case to another is seen, perhaps, most plainly in the reverse process of going back from a new fact to an old one by way of explaining or finding a reason for the former. Children and the uneducated do this to a large extent. They find a

[1] See Carpenter's *Annual Physiology*, Chap. XI., p. 478.

[2] For a fuller account of this capability of automatic inference, see J. S. Mill, *System of Logic*, Bk. II., Ch. III., § 3. Carpenter, *loc sit.* The last writer groups this quality under 'Common Sense'. As Hamilton points out in the note referred to, one of the meanings of this term points to that *uncommon* quality, practical intelligence or tact. In this extension of the phrase we see that it is still setting itself in opposition to reasoning as a conscious process susceptible of formal presentation. The nature of Tact is fully dealt with by Prof. Lazarus, *Das Leben der Seele*, Band 3.

certain intellectual satisfaction in assimilating a new and strange occurrence to one or more familiar occurrences. They account for it by connecting it with what is already common and familiar, without inquiring into the general principle involved in the particular cases. In talking figuratively of the movements of inanimate objects, as when we describe a spark as 'flying' upwards, we all seem to find a measure of that satisfaction which a full explanation by means of a general truth brings to the logical mind.

Explicit Reasoning. It is evident when we reflect on these reasoning processes that we do implicitly assume a general statement. The boy in our example tacitly assumes that 'all wood floats'. If he were not sure of this he would have no business to conclude, 'This piece of wood will float'. And as soon as he is asked to give the ground of his conclusion, or to 'prove' his assertion, he sets forth this general statement. The reasoning then becomes explicit. In so far as we reflect on our reasoning operations we naturally tend to bring them into this form. All the reasoning of science, as distinguished from the rough processes of everyday life, proceeds by way of such general truths or principles. The adoption of this form of reasoning marks the growth of human intelligence, the attainment of the power of general thinking, of distinctly seizing and making clear to consciousness the points of similarity among things.

Inductive and Deductive Reasoning. The full explicit process of reasoning by way of a universal judgment is commonly said to fall into two parts or stages. Of these the first *(a)* is the operation of reaching a general judgment or assertion. This is known as induction. The second *(b)* is the operation of applying the truth thus reached to some particular case (or class of cases). This is known as deduction. Induction is an upward movement of thought from particular instances to a general truth, principle, or law: deduction, a downward movement from some general statement to a particular statement, or at least a statement less general than the first.

Nature of Inductive Reasoning. The psychological process in passing from particulars to a general truth illustrates the essential process of all thinking, the detecting of similarity amid diversity. Let us examine an instance of inductive reasoning. The child observes that his toys, spoons, knives, he himself, and a vast multitude of other objects when not supported fall. He gradually compares these facts one with another and seizes the essential feature of them or the general truth implied in them. He discovers that what all these things have in common is that they are material bodies. He then extricates this general conception, and along with it the circumstance (falling to the ground) which has invariably accompanied it. That is to say, he judges that all material bodies (when unsupported) fall to the ground The operation is a process of reasoning or inference because his mind in making the *universal* assertion passes beyond the limits of the observed cases. 'All' includes not only all the instances he has examined, however numerous these may be, but all unobserved cases.

This process is clearly related to that of generalisation: indeed, induction is often spoken of as generalisation. In each case we trace out a similarity among a diversity of things; in the case of generalisation we do so in things viewed as single or apart, in the case of induction, in things viewed in their connection with some other thing. And just as there are higher and lower conceptions so there are higher and lower inductions. The child begins with a number of narrow inductions, *e.g.*, 'flies die,' 'birds die,' and so forth. He then compares these one with another and extracting what is common to them reaches the higher truth 'All animals die . Later on he couples this with the kindred truth similarly reached 'All plants die,' and so arrrives at the yet more comprehensive induction, 'All living things die'.

Although we usually speak of the process of induction as having to do with classes, there is a precisely similar operation involved in ascertaining the qualities of individual objects in so far as these qualities manifest themselves in a *variety* of forms. Thus the mental process by which we ascertain that a child is truthful, that a man has a refined taste, and so forth, is a comparison of many partially unlike phenomena, viz., actions, and a detection of the underlying common quality.

Spontaneous Induction. The child has a natural tendency to generalise from experience. A single instance often suffices to beget the inference to a general rule. One experience of the burning properties of fire is enough to produce the belief that all fire burns. This natural impulse leads in early life to hasty induction. Here is an example. A boy of two and a half was accustomed to dwell on the fact that he would one day grow to be big. One day as he was using a small stick as a walking stick his mother told him it was too small, on which he at once remarked, 'Me use it for walking stick when stick be bigger'. He had implicitly argued that all things tend to grow bigger in time. The inductions of the young and of the uneducated are often of this type. The tendency of all of us is to argue that what is true of ourselves, and of our own little sphere of observation is true of mankind and of things generally.[1]

Regulated Induction. This natural impulse to generalise on a narrow and precarious basis becomes corrected by wider experience, as well as by education. Thus the child that generalises that all nurseries have a rocking horse like his own, that all dogs take to the water, and so on, learns either by his own observations or from what others tell him that his conclusion is hasty and inaccurate. Pulled up, so to speak, in his early attempts to generalise, he grows more cautious. The impulse to generalise is not arrested, it is simply guided and controlled. Induction now proceeds in a more circumspect and methodical manner. The young inquirer takes pains to collect a wider variety of observations. He examines the instances he thus collects more closely in order to ascertain their essential, as distinguished from their

[1] On the evils of hasty generalisation see Locke, *Of the Conduct of the Understanding* (edited by Prof. Fowler), Lect. XXV. He remarks: 'General observations drawn from particulars are the jewels of knowledge, comprehending great store in a little room; but they are therefore to be made with the greater care and caution, lest, if we take counterfeit for true, our loss and shame be the greater when our stock comes to a severe scrutiny'.

accidental, resemblances. Thus, for example, he finds out that the fact of growth is connected with those properties of things which we call life, and he will consequently restrict the idea to living things.

Induction and Causation. Among the most important truths reached by way of inductive reasoning are those having to do with the causes of things. In order to produce any result we must know the conditions which regulate or determine it. We can only predict events with certainty when we know the circumstances on which they depend. Inquiry into the causes of things thus constitutes a chief part of our reasoning. This is seen in the very use of the word 'reason'. To find a reason for a thing commonly means to ascertain its cause, and so to explain its occurrence.

How the Child reaches the Idea o, Cause. The child's daily experience is continually presenting events or occurrences in a certain order. Thus he soon finds out that food satisfies hunger, that water quenches thirst, that a hard blow gives him pain, and so on. He soon learns too that his own actions produce certain results. Thus he discovers that he can break a stick (if not too stout) by bending it, that he can open the door by turning the handle and then pulling (or pushing), &c. Later on he observes that things about him are related to one another in the same way; for instance, that the appearance of the sun is connected with day-light, of rain with muddy streets. Out of numerous experiences of this kind he gradually arrives at the idea of cause. He then goes beyond the limits of observed facts and concludes that everything that happens, every change in the world about him has its cause.

Idea of Cause and of Purpose. There is good reason to suppose that the child moulds his idea of cause on the pattern of his own actions and their results. That is to say, he conceives of everything which happens as the consequence of some action analogous to his own. The first enquiries of young children, 'who made the snow?' 'who made the flowers grow?' and so forth, point to this conclusion. The production of any result is thought of as brought about by a muscular action. The full development of this idea is seen in the supposition of young children that everything has its use or purpose. The meaning of the question 'why?' in the mouth of a child of three or four is equivalent to, 'For what purpose or end?' It is only after a certain development of intelligence that the child learns to distinguish between the sphere of action with purpose or end, and that of physical causation, or causation without end.[1]

Natural Reasoning about Causes. Children show the natural impulse to generalise most distinctly in concluding about the causes of things. The early age at which they begin to inquire into the causes of events favours the hypothesis that they have an inherited disposition to think in this way, that is to say, to view things as happening because of other things happening. The play of this natural impulse results in many hasty inductions. A very slight

[1] The traces of the origin of the idea are never lost. In the ideas of force which science employs there is still a reference to the original type of causation, action involving muscular exertion.

analogy between things often leads a child to conclude that they have the same cause. This has already been illustrated in the tendency of the young to look at the changes going on in the inanimate world as the results of actions analogous to their own.

Hasty induction with respect to causes shows itself too in other ways. The desire to find some cause for a thing often leads to the fixing of the mind on some attendant circumstance which is only accidentally present, and has nothing to do with the effect produced. Thus a little boy of two once argued that milk was white because it came from a white cow which he had happened to see.

Again, the mind is apt to argue that a thing is always produced by one and the same cause, and this leads to error. Thus a child (about two and a half) having found out that the wind blew off his hat, argued that the slipping off of his glove was the result of the wind's action too.

Regulated Reasoning about Causes. The careful discovery of causes is often a very difficult process, and always implies a method of procedure. Among the more important processes here involved are a careful observation and retention of a variety of instances of the effect produced, and further a painstaking analysis of these instances in order to see exactly what the invariable and essential circumstance is on which the result depends. Thus in order to ascertain the causes of combustion, we compare numerous instances, and by examining these arrive at the common circumstance, the presence of oxygen and of something capable of combining with this.

The process implies, further, active experimenting with things in order to ascertain what circumstances can be taken away or eliminated without affecting the result, and what cannot. Thus in inquiring into the cause of combustion we find that the nitrogen of the air can be removed and the process of combustion still go on, while the oxygen cannot.

The reader should note the close correspondence between the sources of erroneous induction and those of inaccurate conception (see p. 369). As just suggested, a wrong induction arises (commonly) either by examining too few instances, or by hastily and insufficiently inspecting the instances observed. J. S. Mill illustrates the double source of error by the example of crediting a fortune-teller. A person may commit this error either by overlooking all the cases in which the *soi-disant* prophet is wrong; or by not noting that in the cases in which he is right he had been in collusion with another who gave him the information.[1]

Deductive Reasoning. By Induction the child reaches a large number of general or universal judgments. These are supplemented by all the general statements made to him by others in the way of instruction. Having these universal statements he is able to pass on to the second stage of explicit reasoning, namely, Deduction. By this is meant reasoning downward from a general truth or principle to some particular case or class of cases. Thus a child who has been told that all persons are liable to make mistakes, is apt to apply the truth by arguing that his mother or his governess makes mistakes. The type of

[1] *System of Logic*, Vol. II., Book V., Chap. IV., Sect. 2. The student who wishes to understand the systematic orderly processes by which causes are discovered, should consult Mill's treatise, or some other work on Inductive Logic.

deductive reasoning when fully set forth is known as a syllogism, and is as follows :

All M is P.	Everything made by labour costs money.
All S is M.	Toys are made by labour.
Therefore All S is P.	Therefore Toys cost money.

Or for negative arguments :

No M is P.	No naughty children are loved.
All S is M.	This is a naughty child.
Therefore No S is P.	Therefore he will not be loved.

It is evident from this that the nature of the mental process is substantially the same as in the case of inductive reasoning. The essential fact is still assimilation. We recognise an identity between the particular case (S) and a class of cases (M) in respect of its possessing (or not possessing) a certain adjunct or concomitant (P). Thus in the first of the above examples we assimilate toys to other things as products of labour, and by so doing we further assimilate them as having the peculiarity of costing money.

Here, again, we must distinguish between the logical order, required for purposes of proof, and the actual psychological order of the process of inference. We rarely (if ever) proceed in the formal way here set forth from premises to conclusion. In some cases the conclusion first distinctly presents itself to the mind, and the other judgments rise into distinct consciousness later ; and in other cases the mind does not at any stage distinctly represent more than one of the two truths making up the premises.

In cases of simple deductive reasoning where both premises are well known beforehand, the mind may pass at once to the conclusion by means of the process of suggestion already explained. In these circumstances it only distinctly recalls the grounds of the judgment afterwards by way of justifying it or finding a reason for it. In many cases, however, the mind does explicitly refer to one of the premises before reaching the final judgment. The reason why in most instances we do not explicitly refer to both is that we rarely obtain the two pieces of knowledge answering to these statements at the same time. Sometimes we first of all reach the former, at other times, the latter of the premises. As soon as the second piece of knowledge is reached, the mind tends to pass at once from this to the conclusion with only a very indistinct reference to the first and familiar truth. Thus a child who already knew that toys were made by labour, might on first learning that things made by labour cost money, pass directly from this judgment to the judgment, toys (as well as other things) cost money. Similarly, if the second premise happened to be the later piece of knowledge, his mind would not distinctly recall the first.

Induction is sometimes spoken of as a process of analysis, and Deduction of Synthesis. And there is some ground for this distinction. In induction we are chiefly concerned with discovering the common circumstances in a variety of instances, that is to say, with analysing these so as to reach the points of similarity connecting them. On the other hand in deduction, the most striking part of the process is Synthesis or Combination. It is by bringing together two distinct judgments that we reach the conclusion, and facility in deductive reasoning depends on the ability thus to combine old pieces of knowledge in new groupings. In deduction, moreover, the final judgment illustrates the more perfect form of synthesis in which two things are brought together by the mind, and not directly associated by a connection in our experience. At the same time, induction clearly implies a measure of synthesis in so far as it combines two notions in the form of a universal judgment. And on the other hand deduction may be analytic when the judgments are analytic as in the following :—Men are rational beings, Negroes are men, Therefore they are rational beings.[1]

Finding Applications and Finding Reasons. Deductive reasoning may begin at one of two ends. We may have a principle given us and be asked to

[1] The precise nature of deductive reasoning has been much discussed by Logicians. It is doubtful, as Mr. Spencer and others have pointed out, whether the syllogistic form described in the text is capable of representing many of our processes of deductive inferences. Mr. Spencer has fully shown that our inferences, even in cases where they are susceptible of being thrown into this scheme, do not actually conform to it (see his *Principles of Psychology*, Vol. II., Part VI., Chap. VIII., Sect. 305, &c.).

draw conclusions from it. This is applying a principle, or finding out new illustrations of a truth. New discoveries may be made by a skilful combining of truths already known. Thus for example a child after being told or having discovered that air has weight and that it is elastic or compressible might argue out for himself that the lower strata must be denser than the higher.

On the other hand we may set out not with a general truth but with a particular statement or fact of observation, and seek for a principle under which it may be brought. This is finding a reason for a statement, or explaining a fact. Thus a child when told that a certain action is wrong may be asked to say why it is wrong, that is to find out the general rule under which it falls. In observing what happens about him the child is continually explaining things to himself and others by a reference to general truths already acquired. Thus he accounts for the melting of the snow by the sun by bringing it under the general principle that heat melts substances. Similarly he accounts for praise or blame administered in a particular case by referring to a general rule, as that all kind actions are praiseworthy or that all cruel actions are blameworthy.[1]

Imperfect and Perfect Deductive Reasoning. The processes of deductive reasoning may lead to a valid

[1] When no previously ascertained principle or rule can be found, the mind is capable of supposing a reason. This is called framing a hypothesis. In common life and in scientific inquiries we are frequently driven to invent suppositions or hypotheses for the sake of explaining observed facts. This is one of the highest manifestations of the constructive or synthetic activity of the mind.

or invalid conclusion. It is the business of Logic to point out the conditions of valid argument. The psychologist is only interested in the distinction in so far as he has to account for all processes of inference, unsound as well as sound.

Without going into the details of deductive error or fallacy, we may point out that since reasoning is a detection of similarity, the great source of erroneous reasoning is confusion or want of discrimination. As was pointed out above, the bad reasoner cannot see where similarity ends and difference begins. Among the most common errors in deductive argument are those arising from the ambiguity of terms. When the mind fails to distinguish between different shades of idea attaching to the same word, it is exceedingly liable to go astray. Our very eagerness to find a reason for a thing may precipitate us into this confusion; as we see every day in the explanations offered by loose reasoners of things lying beyond their special ken. And any agitation of feeling, by dulling the discriminative power, is greatly favourable to such confusion of thought.

This liability is furthered by the circumstance that in our processes of reasoning words tend to become the substitutes of clear ideas about things. The relations of dependence between judgment and judgment can to a large extent be detected quite apart from any inspection of the meaning of the terms. In many of the rapid processes of internal thought the mind tends to rush from step to step of the reasoning with only the slightest glance at the meaning of the terms. Hence the liability to confusion. Similarly in following the argument of another. When there is the appearance of a logical order in a speaker's or writer's statements, we are strongly disposed to accept the reasoning as valid. The critical mind is one that keeps this impulse to use words 'mechanically' in due check by closely examining into the ideas underlying the words.[1]

Complex Reasoning. Most of our everyday reasonings are not of the simple character just described. They are compound processes. Thus a fact or facts which we observe may suggest a truth (induction) We then go on to draw a conclusion from this. Then perhaps we test this conclusion by new observations. Or we bring the truth thus suggested into relation to other truths already reached, in order to see whether it is consistent with these, and whether it receives any support from them. In other cases we pass by way of deduction alone through a whole chain of reasoning, as when we think out a series of effects of some known cause which we suppose to be put into operation. What we know as a lengthy process of argument is a highly complex chain of inference, in which the mind now sets out from facts or illustrations mounting to truths or principles, now traces out the results of known truths. The methods of science too are made up of such combinations of inductive and deductive reasoning.

Reasoning about Probabilities. An important department of complex reasoning has to do with proba-

[1] Of course this mechanical use of language is in certain cases not only allowable, but a good saving, *e.g.*, in the symbolic language of mathematics (algebraic symbols, &c.). On the nature and limits of such a legitimate use of a language, see J. S. Mill, *System of Logic*, Vol. II., Book IV., Chap. VI., § 6.

bilities. Many so-called universal truths are only roughly or 'approximately' universal. They hold good of most cases of a certain class, but not of all. Hence we cannot have that degree of certainty in reasoning from them that we have in reasoning from such truths as those of geometry, which have no exception. Our conclusions are only probable. The great region of probability is human action, the motives which determine it, and its results. It is always hazardous to say a man must have acted in a certain instance from a given motive; or that a certain plan of action, involving the co-operation of other minds, will in a particular case be followed by a definite result.

This being so, reasoning about probabilities takes place by combining a number of considerations. Thus in order to prove a fact on testimony it is necessary to have corroborative evidence. We cannot safely conclude that because one man asserts a thing, it is true. He may have been mistaken in what he thought he saw. Again, these processes of reasoning involve a weighing of considerations one against another. For example we have often to settle a problem like this: 'Did the child break this by accident or on purpose?' 'Is it self-interest or affection which is prompting him to do this?' 'Will this plan of treatment correct the boy's fault or will it harden him?' In all such cases the mind is called on to consider a number of circumstances and the principles applicable to them, and to decide according to the preponderance of evidence on one side or another, and in some cases even to suspend judgment altogether.

In all such cases the final belief (or suspension of judgment) is a resultant of different tendencies, answering in their relative degrees of strength to the degrees of firmness of the associations involved. Hence the different probative or belief-producing force of the same considerations to different individual minds according to their special experience. It may be added that here, too, the conclusion is frequently reached in the first instance by a process of rapid 'intuitive' insight before the several considerations are distinctly set forth as a logical theory of probability would require. In many cases, indeed, minds which display considerable skill in reaching conclusions by such a complex process of semi-conscious inference are quite unable to set forth the grounds of their conclusion. As we saw above, a man of 'practical judgment' can often decide well, and yet not be able to justify his decisions to others.

The region of practical conduct illustrates this kind of complex reasoning. As we shall see by and by, rational or wise conduct involves the capability of taking in all the circumstances, of measuring accurately the relative probability of this or that result, and the comparative advantages and disadvantages of this or that course of action.

Activity of Mind in Reasoning. From this brief account of the chief varieties of the reasoning process the reader will see its close dependence on the earlier intellectual processes, observation, and reproduction. To carry on a process of reasoning it is necessary that the mind be well stored with facts gained either by personal observation or by instruction. It is further necessary that the mind have a firm hold on truths or principles fitted to explain new facts. To this must be added facility in construction, in forming new notions and hypotheses.

Nor will all this avail without a proper development of voluntary attention and the power of concentration. To reason out a thing implies intense and prolonged activity of mind. In seeking an explanation of some fact, say the odd conduct of one of our friends, the mind performs an elaborate process of search. It has from the beginning to keep steadily in view the object of this search. It then singles out for special consideration from among all the thoughts called up those which bear on this object. Thus in the case supposed we fix our attention on other actions of the same person, or of other persons, on familiar principles of human nature, and so forth, in the hope of finding the key to the puzzle. Not only so, when the process is perfect the will is called on to resist the tendencies to confusion, and the influences of feeling and bias, which have been spoken of above. The greater the concentration, the more perfectly the representation of the desired result dominates all the mental processes of the time, compelling them to converge on this result, the higher will be the quality of the reasoning.[1]

Belief and Knowledge. As we have seen, all knowledge on its *subjective* side is belief. To know a truth is to be assured of it. What the term knowledge implies more than belief is an *objective* fact, namely the adjustment and conformity of belief to reality or truth. The question as to the validity of knowledge, the criterion by which we are to decide how far any belief is objectively valid, is as already pointed out a problem not of psychology, but of theory of knowledge.

Without entering into this philosophical question we may briefly refer to the psychological marks which difference merely believing from knowing. The most obvious difference is one of degree. In every day language we speak of *knowing* when we are perfectly certain and free from doubt, as when we say that the sun is now shining, or that two and two make four. On the other hand, we talk of *believing* when we have an inferior degree of certainty as when we say, that it will rain by and by, or that there are icebergs in the arctic regions. In matters of

[1] Compare the remarks on the relation between power of concentration and intellectual power (p. 100). The nature of the will's action in the control of thought and feeling will be more fully investigated by and by.

memory we say that we *know* a thing happened when the occurrence is recent and the remembrance distinct, but that we *believe* it happened when the event is remote and the images indistinct. Mere strength or intensity of belief, however, is not the sole distinguishing mark of knowing. We often feel 'instinctively' sure of a thing without being able to say that we have knowledge. Blind faith may be of the strongest, yet it is marked off from cognition. Knowing implies, over and above mere belief, a process of reflection on it, a clearing, illumining, or intellectualising of it by critical inspection. In believing we have the emotional aspect of conviction uppermost ; in knowing we have its intellectual side made prominent. Most of our knowing begins as vague conjecture or foreboding, and grows distinct by stages. This applies not only to our every day knowledge, but also to scientific cognition.[1]

The 'conduct of the understanding' has for its object the testing and sifting of our beliefs. This consists in critically examining the meaning of our judgments, rendering the ideas distinct, and finally of considering, in the light of logical principles, their relations of dependence. By these processes the mind reaches knowledge, first of all in the shape of persistent intuitive beliefs which no critical reflection can shake, and secondly, of beliefs which are recognised as following necessarily from these. In this way the first crude beliefs become clear apprehensions of truth, or are dissolved into mere phantoms of knowledge.[2]

Development of Powers of Judgment and Reasoning. The powers of judging and reasoning show themselves later than the power of conception. A child a year old will, as we have seen, name objects, and form rudimentary notions about things, but he cannot yet form explicit judgments.[3] The first ex-

[1] It may be added that the mental state implied in knowing involves a more or less distinct reference to the common mind. Belief, as contrasted with knowledge, is variably affected by the temperament and circumstances of the individual. Hence the consciousness of possessing knowledge includes the assurance that we are one with the common intelligence.

[2] The psychological characteristics of knowledge are dealt with by Volkmann, *Lehrbuch der Psychologie*, § 124. The distinction between Belief and Knowledge has played an important part in philosophical discussions. See Sir W. Hamilton, *Lectures on Logic*, Vol. II., Lect. XXVII., p. 63, and p. 70 *seq.* J. S. Mill, *Examination of Sir W. Hamilton's Philosophy*, Chap. V.

[3] When a child of eighteen months on seeing a dog exclaims 'Bow-wow,' or on tasting his food exclaims 'Ot' (hot), or on letting fall his toy says 'Dou' (down), he may be said to be implicitly framing a judgment : 'That is a dog,' 'This milk is hot,' 'My plaything is down'.

plicit judgments are concerned with individual objects. The child notes something unexpected or surprising in an object and expresses the result of his observation in a judgment. Thus, for example, the boy more than once referred to, whom we will call C., was first observed to frame a distinct judgment when 19 months old, by saying 'Dit ki' (sister is crying).

These first judgments have to do mainly with the child's food, or other things of prime importance to him. Thus among the earliest attempts at combining words in propositions made by C. already referred to were the following: 'Ka in milk' (something nasty in milk); 'Milk dare now' (there is still some milk in the cup). Towards the end of the second year quite a number of judgments is given out having to do with the peculiarities of objects which surprise or impress the mind, their altered positions in space, &c. Among these may be instanced the following: 'Dat a big bow-wow' (that is a large dog); 'Dit naughty' (sister is naughty); 'Dit dow ga' (sister is down on the grass). As the observing powers grow, and the child's interest in things widens, the number of his judgments increases. And as his powers of detecting relations and of uttering and combining words develop, he ventures on more elaborate statements, *e.g.*, 'Mama naughty say dat (2 years).

An interesting phase of this early stage of the growth of judgment is the acquisition of the signs of negation, 'no,' 'not'. The first sign of negation is a shake of the head, but this is used as a mark rather of unwillingness or disinclination than of logical rejection. C. did not make a distinct negative statement till well on in his third year.

The employment of the sign 'no' presupposes a knowledge of two alternatives (truth and falsity). It is greatly aided by the habitual employment of *questions*. A question when understood brings home to the mind two opposed and mutually exclusive statements. The way in which the negative particles are first used is very instructive. C. (early in his third year) was in the habit of framing a statement and then appending the sign of negation thus: 'N. (his name for himself) go in water—no'. It was observed, further, in the case of two children that during the third year they were apt to couple affirmative and negative statements, *e.g.*, 'This I's cup, not mama's cup'; 'This a nice bow-wow, not nasty bow-wow'. This suggests that a child at this early stage when first seizing the meaning of a negation is wont to set forth explicitly the negation implied in an affirmation.

As intelligence develops the child becomes capable of judging not only about particular objects but about classes. Thus he picks up and repeats the general statements made by those about him as for example, 'naughty children play with the dirt'. The growth of the power of judging is marked by an increase of a cautious and critical spirit in relation to affirmation. What is seen is described more accurately. The tendencies to exaggerate, to misstate, due to the influence of feeling (the desire to astonish, amuse, and so on) are curbed. The tendency to give reality to the fictions of fancy is restrained. The child's wider experience supplies him with a rudimentary standard of what is possible and impossible, probable and improbable. Further, the statements of others are inspected and criticised, and so the power of denying or negating strengthened. The transition from childhood to youth is marked by a considerable increase of independence in judging about things. The boy of twelve is apt to form his own opinions about things, and to adhere to them even when opposed by others.

Growth of Reasoning Power. In close connection with this progress of judgment there goes on the development of the power of inferring or drawing conclusions. At first, as observed, the process is implicit, from particulars to particulars. The first distinct trace of this power was seen in the case of C. when he was 17 months old. He asked for bread and butter (which he called 'bup'). Not being immediately attended to, he stretched out his hand towards the bread-knife lying on the table, still repeating the sound. This action clearly implied the recognition of a relation between the knife and the satisfaction of his want. The pressure of want first brought his power of inference into play.[1] A distinct step was noted at the end of the 21st month. His father told him not to eat some brown sugar which he was taking out of a bag. He answered promptly and emphatically 'Ni!' This was clearly finding a reason by way of justification, 'I eat it because it is nice'.

First Reasonings about Cause. As already ob-

[1] His father purposely tried his patience a day or two after when he was asking for 'bup' He looked at him, still clamouring for 'bup'. Then getting more excited he bethought him of the expedient of pointing to his empty plate.

served, the child's first reasonings about cause are very crude. He snatches from his past experience any analogous case in order to explain the happening of things. This leads to an anthropomorphic interpretation of events. For example, C. in his 24th month found a pebble in his box of bricks. His mother asked him what it was doing there, and he replied, 'Wa pay bricks'.[1] Early in his third year he got into the way of asking who made this and that thing. He argued that everything imperfect, such as a flower without a stem, could be 'mended' Again, noticing pips in an orange, he asked 'Who put pips there—cook?'

By the end of the third year a child is wont to perplex his mother by asking the 'Why?' of everything. He now looks at things as occurring for a purpose, and can only understand them in so far as they present some analogy to his own purposive actions.

As the child's mind expands the real relations of things are more clearly detected and set forth in the shape of inductive conclusions. He now begins to apprehend the true nature of causation, to understand the working of the forces of nature about him. But it is probable that no adequate discrimination of the region of human action and of natural causes is reached in average cases till the period of youth is entered on.[2] And it is only in this later stage of development

[1] That is, 'Wants to play bricks' In justice to C. it must be added that he instantly went on to reflect. Looking at the pebble he sagely observed, 'No ands' ('It has no hands').

[2] A girl aged 5 years 9 months once asked her mother, 'What makes the wind, mama? Is it a great big fan somewhere?'

when the powers of abstraction are acquiring strength that the higher inductions which we call the laws and principles of science can be fully grasped.

The same line of remark applies to the growth of deductive reasoning. A boy of 3 or 4 will apply a simple rule to a particular example. But such applications are of the most obvious kind. To recognise an action as one of a certain class (*e.g.*, cruel, or kind), and to reason that it is on that account worthy of condemnation or commendation implies but little power of abstraction, and but little power of detecting similarity among the relations of things. Facility in drawing conclusions from principles is gradually acquired by means of repeated exercises. The growth of reasoning power will manifest itself in discovering the less obvious applications of a rule or principle. And as his stock of general truths increases the boy will find more and more scope for exercising his reasoning powers in drawing conclusions from them. Finally, after his powers of deductive reasoning have been thus strengthened in comparatively simple exercises, he will be able to perform more difficult feats of complex argument, and work out chains of demonstration as those of Euclid.

Varieties of Reasoning Power. There are well marked differences of reasoning power among individual minds. One person has a greater aptitude in discovering similarities among things and their relations, in seizing and applying a principle, than another person. Thus of two men in view of the same group of facts, one will leap quickly to the general law or principle underlying them, while another will fail to detect it. Similarly one man much more readily brings new facts under old truths than another. Superiority of reasoning power is roughly measurable by the facility with which new principles are thus discovered and old ones applied to new cases.

These differences, like those in the case of the other faculties, are general or special. A may be a better reasoner all round than B. But it usually happens that A will show his superiority in some special direction. To begin with, there may be a special leaning to one kind of reasoning process. There is the 'inductive mind,' quick in the observation and analysis of facts, and delighting to trace out the laws of phenomena. Such a mind is wont to refer from principles to facts, and to be sceptical of assertions not grounded on observed facts On the other hand, there is the deductive or demonstrative mind given to dwelling on abstract truths rather than on concrete facts, and skilful in combining these into an orderly argument. The first type is that of the physical inquirer, the second that of the mathematician. A third type is the practical reasoner, apt at seizing all the principles bearing on a complex case, and balancing one reason against another so as to arrive at a just or probable conclusion.

It is to be observed, further, that excellence of reasoning power commonly displays itself in relation to some particular kind of subject-matter. Thus the geometrical reasoner is one who reasons well about geometrical matters, who is quick in detecting the relations between the several properties of figures, and of applying geometrical principles or axioms in new ways. In like manner we find the good chemical reasoner, the good mechanical reasoner, and so on.

These differences, like other intellectual inequalities, turn partly on inequalities of native aptitude, and partly on differences in circumstances and education. Children are not equally endowed with reasoning power to begin with. This is a truth too familiar to need illustration. Not only so, a child may be led by natural taste and disposition to exercise his reasoning powers in a particular way. Thus the boy with a decided turn for active experiment will naturally (other things being equal) be a better physical inquirer than a comparatively inactive boy given to reflection and reverie. Yet while the measure of reasoning power, and to some extent the special field of its operation, are thus in a manner determined by nature, they are both liable to be greatly influenced by the special surroundings of the child, and the type of education which he receives. Though endowed with comparatively feeble reasoning power, he may by judicious exercise attain, if not a brilliant, yet at least a fair measure of proficiency. And much may be done by special training in fixing the precise line of development of the reasoning faculty.[1]

[1] The effect of practice or habit in improving the reasoning power in special directions is well shown by Locke. "It is true that he that reasons well in any one thing has a mind naturally capable of reasoning well in others, and to the same degree of strength and clearness, and possibly much greater, had his understanding been so employed. But it is as true that he who can reason well to-day about one sort of matters, cannot at all reason to-day about others, though perhaps a year hence he may" *(Of the Conduct of the Understanding,* Sect. 6, pp. 20, 21).

Training of the Powers of Judgment and Reasoning. To train a child's power of judging is to exercise him in framing judgments by inviting him to observe and describe an object, to narrate something which has happened to him, to repeat carefully what he has heard, to submit propositions for his acceptance and rejection, and so on. Here the mother or teacher should aim at caution and accuracy of statement. The tendency of children to exaggerate needs to be carefully watched and counteracted. The child should be accustomed to think well about the words he uses, to see all that is implied in them, as well as all that is contradicted by them. And here a knowledge of the logical processes called opposition, conversion, and obversion will prove serviceable to the teacher. All this regulation of judgment is however a matter of some delicacy. Children delight in vivid and picturesque statement, and a touch of exaggeration is perhaps pardonable. A too strict insistence on precision in the early stages may discourage confidence, and lead to an untimely hesitation in judgment.

A perplexing problem in the training of the judgment is to draw the line between excessive individual independence, and undue deference to authority. The power of judgment is, as we have seen, more fully exercised when the child forms an opinion for himself than when he passively receives one from his mother or teacher. To exercise the judgment is thus to draw out his power of judging for himself. And this can be very well done in certain regions of observation, as for example in judging about the beauty of natural objects and works of art. On the other hand, it is obvious that with respect to other matters the child's liberty of judging must be curtailed. It would not do to allow a young child with his limited experience to decide what is possible or probable in a given case; and still less to permit him to pronounce on the rightness or wrongness of an action. To combine the ends of authority and of individuality in respect of judging requires much wisdom and skill in the trainer of the young. Differences of children's temperament (sexual and individual) must here be taken account of. To train a boy's power of judgment is in general a different process from that of training a girl's. A timid child disposed to rely on others requires another regime from that suitable to a rash and confident child disposed to question all authority and to set up dogmatically his own views of things.

The training of the Reasoning Powers must go on hand in hand with that of Judgment. In the earliest stage (from about the beginning of the 4th year) the mother is called on to satisfy the child's curiosity or desire for explanation. This period is an important one for the subsequent development of the child. Parents are apt to think that children not infrequently put questions in a half-mechanical way, without any real desire for an explanation, and even for the sake of teasing. Without as yet going into the question of the nature of children's impulses of curiosity, we may say that so far as their questionings involve a genuine desire for knowledge, it is well in general to heed and satisfy them. It seems a good rule to give an explanation wherever a simple one is possible, provided of course that the knowledge is not attainable by the child's own intellectual exertions. This is Locke's advice: 'Encourage his *Inquisitiveness* all you can, by satisfying his demands, and informing his Judgment, as far as it is capable (*Some Thoughts concerning Education*, § 122)'.[1] It may be even well at first to descend to the child's level, and to look at the world through his anthropomorphic glasses. The forces of nature may be personified and so her simple processes (*e.g.*, the exhalation of vapour and its condensation in rain) presented to the child in a form which is not only intelligible but which is certain to interest him by its picturesqueness.[2]

[1] Of course children's questions are often unanswerable. Thus a little girl of $4\frac{1}{2}$ years once drove her mother to one of the most difficult problems of philosophy—thus: She sees a wasp on the window pane and wants to touch it. Her mother says, 'No, you must not, it will sting you'. Child: 'Why doesn't it sting the glass?' Mother: 'Because it can't feel'. Child: 'Why doesn't it feel?' Mother: 'Because it has no nerves'. Child: 'Why do nerves feel?' The young must be exercised in taking some truths on trust, and not asking the 'why?' of everything. George Eliot says somewhere: 'Reason about everything with your child, you make him a monster, without reverence, without affections'. The problem how to deal with children's questions is thoughtfully handled by M. Perez, *L'Éducation dès le Berceau*, Chap. II., p. 45, *seq.* The solution of the problem clearly turns largely on our view of the nature of children's curiosity, a subject to be touched on by and by.

[2] This way of presenting simple scientific facts and truths to children has been attempted with eminent success by Miss A. Buckley in her pleasant volume, *The Fairyland of Science*.

But the training of the reasoning powers includes more than the answering of the spontaneous questionings of children. The learners must be questioned in their turn as to the causes of what happens about them. A child cannot too soon be familiarised with the truth that everything has its cause and its explanation. The mother or teacher should aim at fixing a habit of inquiry in the young mind by repeatedly directing his attention to occurrences, and encouraging him to find out how they take place. He must be induced to go back to his past experiences to search for analogies, in order to explain the new event.

The systematic training of the reasoning powers must aim at avoiding the errors incident to the processes of induction and deduction. Thus children need to be warned against hasty induction, against taking a mere accidental accompaniment for a condition or cause, against overlooking the plurality of causes. This systematic guidance of the child's inductive processes will be much better carried on by one who has studied the rules of Inductive Logic. In like manner the teacher should seek to direct the young reasoner in drawing conclusions from principles, by pointing out to him the limits of a rule, by helping him to distinguish between the cases that do, and those that do not fall under it, and by familiarising him with the dangers that lurk in ambiguous language. And here some knowledge of the rules of Deductive Logic will be found helpful.

The training of the powers of judgment and reasoning should be commenced by the mother and the elementary teacher in connection with the acquisition of common everyday knowledge about things. Its completion, however, belongs to the later stage of methodical school instruction. There is no subject of study which may not in the hands of an intelligent and efficient teacher be made helpful to this result. Thus the study of physical geography should be made the occasion for exercising the child in reasoning as to the causes of natural phenomena. History, again, when well taught, may be made to bring out the learner's powers of tracing analogies, finding reasons for events (*e.g.*, motives for actions) and balancing considerations so as to decide what is probable, wise, or just in given circumstances.

The teaching of science is however the great agency for strengthening and developing the reasoning powers. Science is general knowledge expressed as precisely as possible, and the study of it serves to give accuracy to all the thinking processes. Science is further an orderly arrangement of knowledge according to its dependence. It sets out with principles gained by induction, and then proceeds in a systematic way to trace out deductively the consequences of these principles. It thus serves to train the reasoning powers in an orderly and methodical way of proceeding.

Some sciences exhibit more of the inductive process, others more of the deductive. The physical sciences are all, to some extent, inductive, resorting to observation, experiment and proof of law by fact. And some of these, as for example chemistry and physiology, are mainly inductive. In these the inquirer is largely concerned with observing and analysing phenomena and arriving at their laws. On the other hand, the mathematical sciences are almost entirely deductive. Here the principles are simple and self-evident, and the stress of the reasoning is the combining of these and arriving at new results by deduction or demonstration. Hence physical science offers a better training in inductive reasoning, whereas mathematics supplies the better exercise in deductive reasoning.

All sciences as they progress tend to grow deductive. That is to say, deduction plays a larger and larger part in them. This is illustrated in the growing application of mathematics or the science of quantity to the physical sciences. It holds good, however, of all branches of science. Thus, for example, it applies to grammar and the science of language. At first men had to observe and analyse the facts, the various forms and connections of words, as used in every day speech, and to discover the laws which govern them. But the laws once reached, the science takes on a deductive form, that is, sets out with definitions and principles and traces out their results.

This being so, it follows that the proper order of exposition, or the method of teaching, may deviate from the natural order of arriving at knowledge by the individual mind left to itself. In other words the 'Method of Instruction' differs from the 'Method of Discovery'.[1] Yet the natural order ought never to be lost sight

[1] See Jevons, *Elementary Lessons in Logic*, Lesson XXIV.

of. Principles cannot be taught before *some* examples are given, though it may be unnecessary to retravel over all the inductive steps by which the race has arrived at these principles. Even such 'self-evident' truths as the axioms of geometry require, as mathematical teachers are well aware, a certain amount of illustration by concrete instances.[1] Thus the right method of teaching a subject illustrates in a manner the order of discovery.

Much the same kind of considerations as apply to the best order of expounding a single subject apply to the best order of dealing with different subjects. This is broadly determined by psychological principles, the laws of the growth of faculty. Psychology tells us that subjects appealing mainly to memory and imagination (*e.g.*, geography and history) should precede subjects exercising the reasoning powers (mathematics, physical science). But within these broad limits the special arrangement has to be determined by logical considerations. That is to say, we have to consider the relative simplicity of the subjects, and the dependence of one subject on another. By such considerations we arrive at the rule that applied mathematics should follow pure, and that physiology should come after chemistry.[2]

APPENDIX.

On the nature of the processes of Judging and Reasoning it is difficult to refer the reader to good authorities in English. These operations have been usually dealt with by the logician for his special purpose, and the psychologist has too often been content to accept his account of them. Perhaps the best analysis of the reasoning process is contained in Mr. H. Spencer's chapters on *Reasoning* in his *Principles of Psychology*, Vol. II., particularly Chap. VIII. It is however in German works on psychology that the nature of the operations of judging and reasoning is best unfolded. See especially Waitz, *Lehrbuch der Psychologie*, Section IV., § 49 and following; Volkmann, *Lehrbuch der Psychologie*, Section VII. B and C; Horwicz, *Psychologische Analysen*, 2er Theil, 1e Hälfte.

[1] What applies to practical principles applies to those of Science

"Longum iter est per præcepta:
Breve et efficax per exempla".

[2] In connection with this subject the reader should read Prof. Bain, *Education as a Science*, Chap. VI., 'Sequence of Subjects—Psychological,' Chap. VII., 'Sequence of Subjects—Logical'; also his appendix on the classification of the Sciences in his *Manual of Logic*.

In connection with the practical side the student should read Locke's little work *Conduct of the Understanding* (edited by Prof. T. Fowler). He should further master the elements of deductive and inductive logic as expounded in such a work as Professor Jevons' *Elementary Lessons.* Finally, on the application of Logic to Educational Method the student may consult (in addition to the chapter in Jevons' *Elementary Lessons)* Th. Waitz's *Allgemeine Pædagogik,* § 22.

CHAPTER XI.

FEELING: SIMPLE FEELINGS.

HAVING now briefly reviewed the growth of intellect, we may pass on to trace the second great phase of mental development, the growth of the feelings.

Feeling defined. By feeling is meant any state of consciousness which is pleasurable or painful. The feelings are pleasures and pains of various sorts, agreeable and disagreeable states of mind. Every feeling is either pleasurable or painful, agreeable or disagreeable, in some degree. At the same time there are many mixed states of feeling, such as grief, anger, and so on, which are partly the one and partly the other, and it is sometimes difficult to say which element preponderates.[1]

In the second place feeling includes pleasures and pains of all kinds. Thus the term covers first of all those simple mental effects which are the direct result of nerve-stimulation, and which are commonly marked off as 'sensations' of pleasure and pain, such as the pains of hunger and thirst, and the corresponding

[1] Prof. Bain speaks of a third mode of feeling distinct from pleasure and pain, which he calls neutral excitement (*The Emotions and the Will*, 3rd Ed., p. 13, &c.). It may, however, be questioned whether any feeling as such can be indifferent. See Volkmann, *Lehrbuch der Psychologie*, II., Sect. 128.

pleasures. In the second place, the term feeling comprehends the more complex effects which depend on *mental* activity of some kind, and which are marked off as emotions, such as fear, hope, admiration, and regret.

Importance of studying the Feelings. As we have seen, the feelings constitute a distinct, well-marked phase or division of mind. Our pleasures and pains make up the *interesting* side of our experience. The objects of the external world only have a value for us in so far as they touch our feeling. The life of feeling, of joy and sorrow, is in a peculiar sense our own inner life. Our knowledge has to do with external things, our actions when carried out are external events, but our feelings belong to the inner subjective world. Since the feelings are the elements of happiness (or misery) it is clear that some knowledge of their nature and laws is necessary to a sound theory of the conditions of happiness.

But feeling is not merely a subject of great importance in itself: it stands in certain relations to the other two sides of mind. On the one hand it is connected with intellectual growth, since it supplies the interest of study. Hence no theory of intellectual culture can be complete without some reference to the emotional susceptibilities. On the other hand, feeling stands in intimate connection with action and will. The incentives and motives to action are represented feelings (anticipations of satisfactions of various kinds). The habitual directions of conduct follow the lead of the dominant feelings. Hence the study of the feelings is of great practical moment as a preparation for the theory of moral culture, and the formation of character.

Relation of Feeling to Knowing. The relation of the emotional to the intellectual side of mental growth calls for a little fuller consideration. It is a relation at once one of mutual opposition and of reciprocal aid.

In the first place, feeling and knowing are in a manner opposed. The mind cannot at the same moment be in a state of intense emotional excitement and of close intellectual application. All violent feeling takes possession of the mind, masters the attention, and precludes the due carrying out of the intellectual processes. Nice intellectual work, such as discovering unobtrusive differences or similarities among objects, or following out an intricate chain of reasoning, is impossible except in a comparatively calm state of mind. Even when there is no strong emotional agitation present, intellectual processes may be interfered with by the subtle influence of the feelings on the thoughts working in the shape of bias. Thus a child that finds a task distasteful is apt to reject the idea that the study is useful. His feeling of dislike prejudices his mind and blinds him to considerations which he would otherwise recognise. Hence the special difficulties which, as every teacher knows, are connected with the intellectual training of children of a highly emotional temperament.[1]

On the other hand, as we saw above, all intellectual

[1] On the effect of feeling in interrupting the intellectual processes, see above, pp. 316, 404. The perturbing effect of violent excitement on the attention is closely connected with its effect on the muscles to be spoken of presently.

activity, since it implies interest, depends on the presence of a certain moderate degree of feeling.[1] It may be said, indeed, that all good and effective intellectual work involves the presence of a gentle wave of pleasurable emotion. Attention is more lively, images recur more abundantly, and thought traces out its relations more quickly when there is an under-current of pleasure. Hence rapid intellectual progress is furthered by lively intellectual feelings.[2]

It would appear to follow from this that the growth of intellect itself in all its higher phases implies the strengthening of certain feelings. In order that there may be an interest in study and a motive for intellectual effort certain emotions must be developed in the child's mind, such as the pleasure of gaining reward, affection, and the 'intellectual emotions' of curiosity and love of knowledge.

While the progress of knowing thus depends in a measure on that of feeling, the latter is still more largely determined by the former. Feeling in all its higher forms (emotions) involves intellectual processes. It is the immediate accompaniment of perceptions, representative images, and so on. Thus fear is occasioned by the sight or the mental image of an object, *e.g.*, a mad dog. Self-esteem (in its developed form) presupposes the idea of self and the recognition of certain qualities (*e.g.*, skill, virtue) as belonging to self. Many of our feelings, as affection for a person and patriotism, involve numerous and complicated

[1] See above, pp. 83, 92.

[2] Goethe observes that the greatest depth of thought involves the greatest development of emotion.

processes of intellectual representation. The highest feelings of all, such as reverence for truth and the sentiment of justice, presuppose a process of abstract thought, and consequently a considerable measure of intellectual development. Hence the changes of emotional life attending changes of intellectual pursuits, and the progress of intellectual culture. This dependence of feeling on intellectual activity makes it convenient that the exposition of the Emotions should follow that of the Intellect.[1]

We thus see how the cultivation of intellect and of emotion involve one another in a measure. In order to exercise the intellectual powers to the utmost, we must aim at making study pleasurable. And if we wish to strengthen the higher emotions, such as the moral sentiment and the love of truth, we must seek to exercise the intellectual powers.

The Expression of Feeling. The close connection between mind and body is nowhere more plainly illustrated than in the correlation between states of feeling

[1] The close connection between feeling and intellectual activity (representation) is emphasised by the German psychologists. Herbart, the founder of the modern German school of psychology, sought to explain pleasure and pain as the result of the interaction (mutual furtherance and hindrance) of representations. The relation of feeling to intellectual activity (Vorstellen) is carefully discussed by Volkmann (*Lehrbuch der Psychologie*, Vol. II., Sect. 127 and Sect. 129), who argues strenuously against the older psychological theory that feeling and intellection are necessarily antagonistic. *Cf.* Lotze, *Mikrokosmus*, Vol. I., p. 272, &c. In this country the intellectual or representative substratum of feeling has been emphasised by Mr. H. Spencer (*Principles of Psychology*, Vol. I., Part IV., Chap. VIII.). This writer gives a new significance to this connection by means of his theory of Evolution. According to this, our feelings are to no small extent made up of confused representations (vague memories, echoings) of ancestral experiences. A novel view of the relation of feeling to intellection or thought has been propounded by Horwicz, who regards thought as secondary to, and as a reaction on, feeling. (See Appendix B.)

and certain bodily accompaniments. Feeling is accompanied by well-marked physical changes, including those external manifestations which are commonly called expression, facial movements, gestures, modifications of vocal utterance, &c., together with certain internal organic effects. Pleasure and pain, and to some extent the several kinds of pleasurable or painful feeling, as anger, fear, love, reverence, have their distinct or characteristic expression. So close is this connection between the feeling and its bodily manifestation that the adoption of the external signs of an emotion (look, gesture, &c.) disposes the mind to fall into the appropriate feeling. This is illustrated not only in the experiences of the actor but also in the workings of sympathy which appears to begin with the imitation of the external signs of feeling. The same fact of a close connection between feeling and its bodily manifestation is seen in the control of feeling by the will. This, as we shall see, involves the checking or inhibiting of the external movements.

The relation of Emotion to its bodily concomitants is a peculiarly close one. All feeling, as involving an excitation of the nerve centres, tends to 'diffuse itself' over the nervous system in a cycle of effects. The full development and continuance of a feeling depends on this series of irradiating physical effects. When these are cut off, as when we instantly repress the manifestation of a feeling, the emotional excitement is greatly abated, and tends to subside. These physical changes have in their turn concomitant sense-feelings (*e.g.*, those attending the disturbance of the heart's action in fear, those accompanying the partial innervation of certain voluntary muscles in anger) and these last combine with, and serve in part to give the character to, the emotion. But they can be distinguished from the emotion proper to some extent, and as Volkmann points out, they frequently outlast this in duration. The familiar fact that 'giving way' to the pressure of feeling tends to expedite its subsidence may be explained by the consideration that the movements carried out in this case cause a loss of intensity in the sensations accompanying the emotion.[1]

Theories of Expression. These movements of expression are partly instinctive, partly acquired. Crying, smiling, frowning, &c., are instinctive, appearing uniformly in all cases very early in life Other movements as clenching the fist are largely if not altogether instinctive. In certain cases, imitation (conscious or unconscious) plays a part. In this way we acquire to some extent, at least, the actions expressive of moral displeasure (scolding, &c.) ennui, and so forth. In some cases the will distinctly co-operates in the acquisition of so-called expressive movements, as in adopting the customary look, tone of voice and gesture of polite life.

Several theories have been propounded to account for these expressive movements. It is generally agreed that owing to the close correlation of mental and bodily processes, all feeling tends to produce certain bodily effects, including movements, which are in their strength and range proportionate to the intensity and persistence of the feeling. Mr. Spencer seeks to show how feeling as it rises in intensity engages muscles of larger and larger calibre, *e.g.*, movement of fingers (twitching), then movement of arms, &c., as agitation increases. Wundt adds that all feeling involves the motor centres of attention, and so tends to disturb the due regulation of the thoughts. This is seen most conspicuously in the effect of violent emotion of all kinds. In this case, where we have the effect known as emotional shock, there is not only a paralysing of the muscles, but an overpowering of the attention.[2]

In order to account for the distinctive movements connected with special kinds of feeling various theories have been propounded. Dr. Bain contends that since pleasure is connected with an increase, and pain with a decrease, in the vital energies, the expression of pleasure contrasts in general with that of pain in respect of the greater vigour of the actions. But the differences of vigour characterising the expression of the various feelings do not seem to be connected with their pleasurable or painful character. Strong and violent feelings whether pleasurable or painful have very like results. Not only so, the strongly marked contrast in point of energy between certain feeling, *e.g.*, anger on the one side, and fear on the other, does not coincide with a contrast of pleasurable and painful. It seems connected with the nature of the feeling as exciting to activity or energetic in character, or depressing and paralysing.[3]

[1] This is Volkmann's theory. The reader will do well to read his interesting account of the relation of emotion to what he calls reflex sensation, *Lehrbuch der Psychologie*, Vol. II., § 129.

[2] See his *Physiol. Psychologie*, II., Cap. XVIII., p. 328, &c.

[3] Kant divided feelings according to this mode of manifestation into sthenic and asthenic. See Wundt, *loc. cit.*, p. 329.

This leads on to the question how particular modes of feeling, as anger, come by their characteristic bodily expression. So far as these expressions are instinctive, they are attributed to the action of two causes. (1) Certain movements were originally connected with certain pleasurable or painful sensations as useful or serviceable actions, whether consciously carried out for a purpose or not. Thus the muscular action involved in shedding tears was originally called forth by the presence of an irritating substance in the eye ; the action of raising the palate and pressing down the tongue at the thought of something 'bitter' was originally performed in swallowing a bitter substance. This would bring about a firm association between sensation and movement, so that the representation of the former would tend to call forth the latter. (2) The extension of the movement (by the force of suggestion by similarity) to analogous feelings of all kinds. Thus the action of secreting tears would become associated with all painful feelings, the action of raising the palate, &c., with all 'bitter' experiences. These connections or associations have been slowly built up in the course of the development of the race, and are transmitted to each individual in the form of instinctive tendencies.[1]

The Observation of Feeling: Temperament. The fact that feeling thus distinctly manifests itself by well-known expressive movements is of great importance for the accurate observation of feeling. More particularly the feelings of the young (who as a rule, not having yet learnt the art of self-control and disguise, are very frank in the expression of their feelings), can be easily observed by means of these external manifestations. In this way we are able to some extent to measure feeling or emotional susceptibility. Thus we may compare two children with respect to the intensity and duration of a feeling under similar circumstances. Or we may proceed by comparing the

[1] On the principles by which the phenomena of emotional expression can be explained, see H. Spencer, *Principles of Psychology*, II., Part VIII., Chap. IV. ; Prof. Bain, *The Senses and the Intellect*, 3rd Ed., Chap. IV., § 11 *et seq.* (*cf.* Appendix B) ; C. Darwin, *Expression of the Emotions*, Chaps. I.—III. ; Wundt, *Physiol. Psychol.*, II., Cap. XXII. I have critically compared the main theories in my volume, *Sensation and Intuition*, Chap. II.

different amounts of stimulus or exciting force needed to call forth a certain quantity of feeling in two cases.

By this means something may be done to determine differences of emotional temperament. We shall find that some minds are more susceptible to pleasurable and painful stimulations generally; others more susceptible to the pleasurable than the painful results of stimulation, or *vice versa;* and others, again, more susceptible to particular modes of stimulation, as for example the excitation of angry feeling, and so on.[1]

Laws of Pleasure and Pain. Psychologists have long endeavoured to bring all the varieties of pleasure and pain, 'bodily' and 'mental,' under certain laws. Although they cannot as yet be said to have perfectly succeeded, they have formulated one or two principles which appear to be approximately correct, and which are of some practical consequence.

Law of Stimulation or Exercise. Of these the principal law may be called the Law of Stimulation or the Law of Exercise. All pleasure is the accompaniment of the activity of some organ which is connected with the nerve centres, or the seat of conscious life. Or, since this activity has its psychical concomitant, we may say that all pleasure is connected with the exercise of some capability, faculty, or power of the mind. And it will be found in general

[1] On the difficulties of estimating others' feelings, see Bain, *The Emotions and the Will*, 3rd Ed., Chap. I. (Interpretation and Estimate of Feeling). The problem of classifying differences of emotional temperament on a scientific principle has not yet been solved. The problem has been touched on by Lotze, *Mikrokosmus*, 6es Buch, 2es Kap; Wundt, *Physiol. Psychologie*, Cap. 18, § 2; and by the other writers already referred to (see p. 37). See further, my volume, *Pessimism*, Chap. XIV.

that all moderate stimulation of an organ, or all moderate exercise of a capability, produces pleasure.

We may look at the pleasure as connected either with nervous conditions, the activity of some organ, as sense-organ, muscle, brain itself, or with some mode of mental activity. In setting forth the principle some writers, as Hamilton, refer to the mental activity involved, whereas others refer to the nervous processes. In general the nervous conditions are more obvious in the case of simple sense-pleasures, the mental activity, in the case of the complex pleasures or emotions. But nervous conditions of some kind are involved in all varieties of pleasure. On the other hand, even in the case of the simplest pleasures there is involved a rudimentary form of mental activity, namely that necessary to having an impression with a certain degree of vividness.[1] The objection against speaking of pleasure generally as connected with mental *activity* is that by so doing we are apt to overlook passive pleasures, more particularly those connected with the stimulation of the sense-organs. Looking at its physiological conditions we find that pleasure seems specially related to the *sensory* side of the nervous system. Even in the case of active pleasures, *e.g.*, those of muscular exercise, sensory stimulation probably plays an important part.

This general law is most clearly illustrated in the region of sensation, and particularly the sensations of the higher senses. All moderate excitation of the eye and the ear by their appropriate stimuli is pleasurable. And the pleasure goes on increasing with the strength of the stimulus up to a certain point. This may be seen in the effect of dawn, and of a crescendo passage in music. The same law is observable too in the case of muscular exercise, and what we mark off as brain exercise or intellectual activity. Moderate excitation is agreeable, and the degree of its pleasure increases with the amount of activity up to a certain point.

When, however, the stimulation passes a certain

[1] Some writers, as Leibniz, suppose that in all cases the immediate condition of pleasure is a mode of mental activity, namely a cognition ('perception,' ranging through all degrees of distinctness) of furthered vitality.

limit the pleasurable effect diminishes, and rapidly passes into a distinctly painful effect. Thus when the light of the rising sun exceeds a certain intensity the eye is fatigued or 'blinded'. Similarly very loud sound is disagreeable to the ear. Violent muscular exercise, intellectual activity involving great effort, are for a like reason painful.

Scale of pleasurable and painful Stimulation. The exact relation of the degree of pleasurable or of painful feeling to the strength of the stimulus is a matter of some difficulty. Wundt conceives a scale somewhat as follows. As soon as the stimulus passes the threshold and causes an appreciable sensation it begins to be pleasurable, and the pleasure goes on increasing as the stimulus is increased. At length a point or region of maximum pleasure is reached which probably answers to that medium region of the scale where the finest discrimination is possible. From here on the pleasure rapidly diminishes till a certain 'point of indifference' is reached. Above this any further increase produces pain, which in its turn increases till at the point known as the Height (see above, p. 115) the maximum of pain is reached (*Physiol. Psychologie*, Cap. X., Sect. 1). Wundt's supposition of an indifference-point corresponds to some extent with Bain's idea of a neutral mode of excitement already referred to.

While all pleasure seems to come by way of moderate stimulation or activity, all pain does not arise by way of excessive stimulation. Painful states of feeling are occasioned in certain cases by the want of an appropriate stimulus. This is illustrated to some extent in the effect of darkness. Prolonged darkness gives rise to a craving for light, which in part seems connected with the circumstance that the organ is ready for activity, but wants the necessary stimulus. The restlessness and uneasiness of an active boy who cannot indulge in muscular activity, and the mental condition known as tedium, ennui, dullness, which is connected with the absence of agreeable mental stimuli or of outlet for mental activity, illustrate the same principle.[1]

The painful feeling of craving is apt to be aroused by all obstructions to activity These give rise to a disagreeable sense of arrested or impeded activity. Thus when a train of thought is obstructed by forgetfulness of some link there is this craving for a free outlet. The pains due to obstruction commonly involve in addition to this an excess of activity in the shape of a wearing effort to overcome them.[2]

It appears to follow that pleasurable activity lies between two extremes of excessive or strained, and defective or impeded exercise. It is important to add that the terms moderate, excessive and defective are relative to the customary amount of activity answering to the natural strength, and the acquired habits of the organ. An organ like the eye that is called on to be active through a great portion of the waking life rarely gives us the pain of fatigue. On the other hand, a sense-organ like that of smell, which is only stimulated at rare intervals, and in an irregular way, gives us no sense of craving when the stimulus is absent. The moderate degree of activity is, further, related to the temporary condition of an organ as fresh and vigorous, or feeble. An amount of muscular exercise which is pleasurable to a vigorous child will be painful to a weakly one.

It is reasonable to suppose that the moderate activity of an organ (as now defined) is beneficial to

[1] These pains of want or craving are duly emphasised by Mr. Spencer, *Principles of Psychology*, Vol. I., Part II., Chap. IX.

[2] Here the state of want, craving, or desire is looked on as a *passive* state of feeling only. Its relation to action will be considered further on.

that organ, promoting its health, and continued efficiency On the other hand either excess or deficiency of activity may be supposed to be injurious, the first by overtaxing and exhausting its energy (and possibly damaging its structure), the second by leaving energy pent up and needing a vent. We may say then that pleasure depends on a due balance between the process of stimulation on the one hand, and that of reinvigoration on the other, or between the expenditure and the accumulation of energy.

There are, as hinted, one or two apparent exceptions to this general principle. In the first place, even low degrees of stimulation, involving no excess of activity, may be painful. For example, bitter tastes are disagreeable in all degrees. Wundt tries to meet this difficulty by saying that in this case the indifference-point is so low that it is no longer distinguishable from the threshold.[1] Other phenomena, however, as those of musical dissonance, which are disagreeable in all degrees, have led some, as Fechner, to conjecture that pleasurable activity may depend not only on the quantity or degree, but on the form of the stimulus as suitable or unsuitable in some way to the requirements of the organ.[2] In the second place the absence of activity seems to be the occasion not only of the pains of craving but of the pleasures of repose. This will be touched on again under the following supplementary principle.[3]

Principle of Change or Contrast. As a second subordinate principle of pleasure and pain we have

[1] *Loc. cit.*, pp. 470, 471.

[2] *Vorschule der Æsthetik*, II., p. 266.

[3] The law of stimulation or exercise just formulated has been variously expressed. Thus the pleasure has been referred to the increase of nerve-energy, the transformation of potential energy into living force, and so forth. For some of the modes of expressing the main law of pleasure, see Hamilton, *Lectures on Metaphysics*, XLIII. ; L. Dumont, *Théorie de la Sensibilité*, 1re Part, Chap. II. ; Horwicz, *Psych. Analysen*, 2er Theil, 2e Hälfte, Sect. 2 *seq.* On the difficulties in the way of reducing all pleasures to a simple principle of stimulation, see J. S. Mill, *Examination of Sir W. Hamilton's Philosophy*, Chap. XXV., and Mr. E. Gurney, *Power of Sound*, Chap. I., Sect. 2.

the law of change or contrast. We have already seen (p. 85) that a change of impression is a condition of prolonged mental activity. We have now to note its effect on the feelings, and more particularly on the pleasures. The understanding of the precise bearing of change or variety of stimulation on the emotional life is a matter of prime importance.

Effect of Prolongation of Pleasurable Stimulus. In order to understand the effect of change on the intensity of our pleasures it may be well to glance at the correlative fact, the effect of prolonged and of unvarying stimulation, and, generally, of what we call familiarity and custom. It follows from the general principle of pleasurable stimulation, that a powerful stimulus continuing to act, or frequently renewing its action, may become painful by fatiguing or injuring the organ concerned. A momentary blast of a horn, may be agreeable, but the continuance or frequent renewal of the sound will be disagreeable.

In the second place, even when there is no disagreeable effect produced, a pleasurable stimulus if it continues to act loses its pleasurable effect. The same sight or sound 'over and over again' soon ceases to be a stimulus to attention. When we first walk out into the fields on a spring morning the bright green of the fields and woods, and the song of the birds ravish us. But after an hour's walking we hardly notice them. Many of the activities of the organism, being constant and unvarying, supply under ordinary circumstances no distinct consciousness, and therefore no pleasure at all. Thus there is little enjoyment attending the exercise of the respiratory functions in a usual way. And mental activity in so far as it becomes regularly recurrent and uniform approximates in character to this bodily activity. Our daily routine of work is apt to lose its first pleasurableness by its very uniformity. Unvarying surroundings however agreeable at first, the same scenery and the same faces, are apt to pall on the mind, producing the sense of monotony and the craving for change.

Some writers have sought to give a precise form to the law of abatement or 'decay' of pleasurable excitement. Dr. Bain argues that "it is rapid at first; while after a certain time, which may be weeks or months, but seldom years, the further diminution is imperceptible" (*The Emotions and the Will*, Pt. I., Chap. IV., § 3). We must carefully distinguish between the effects of perfect uniformity or constancy and of frequency in the application of the stimulus. Our home surroundings, the pictures on the walls, &c., by being always with us tend to lose their pleasurable effect. On the other hand regularly recurring pleasures, as those of the table, social intercourse, &c., though by reason of their regularity subject to the effect of abatement, by reason of their intermittant character satisfy the conditions of change to some extent. This tendency to loss or abatement in the case of all prolonged or frequently recurring pleasures is counteracted in a measure by a number of agencies. Of these one of the most important is the imagination of the absent term of the antithesis or contrast. By keeping in mind the state of things in which the customary source of pleasure is absent we are able to renew at will to some extent the first vivid intensity of enjoyment. Thus we derive a considerable pleasure from the consciousness of being in health, of being well provided for, &c., by recalling the time when we wanted these good things, or by imagining ourselves as wanting them. Hence the value of all art that depicts or represents wretchedness: it supplies to the imagination the foil or element of contrast by a reference to what we realise some customary good, and an old and familiar pleasure becomes in a manner a new one. Persons of a vivid imagination, though they are exposed to more suffering on this account, are in a much better position to derive pleasure from customary and abiding sources than others.[1]

[1] Other counteractions, more particularly the effect of association in deepening the emotional value of what is familiar will be spoken of by and by.

Effects of Change on Pleasurable Feeling. We see then that pleasure involves change or contrast of mental condition for a double reason: (1) because all the more powerful modes of pleasurable stimulation need to be limited in duration if they are not to fatigue and produce pain instead of pleasure; and (2) because change, variety, or contrast of impression, is a condition of that vigorous activity of attention on which all vivid states of mind depend. The greater the amount of change involved (provided it is not *violent*, that is so great and sudden as to produce the disagreeable effect of shock) the more intense in general will be the resulting pleasure. Hence the peculiar effect of strong contrasts in our experience, *e.g.*, between town and country surroundings.

This principle of change may be viewed under one of two forms. In the first place, a pleasurable activity of any kind may be regarded as a transition from an inferior degree of activity of the particular organ or faculty concerned. By inferior is here meant less pleasurable, or painful instead of pleasurable. This may be called the effect of change or contrast in the *degree* of activity. In the second place, a pleasurable activity may be viewed as a deviation from a preceding unlike mode of activity This may be called the effect of change or contrast in the *kind* of activity. It is commonly known as the effect of Variety and Novelty. A word or two may suffice to illustrate each effect.

Change in Degree of Activity. Activity is pleasurable in so far as it is a transition from a previous state of inactivity or of less activity The most intensely pleasurable activities are preceded by a state of impeded activity or enforced inactivity, with its attending painful feeling of craving. Thus we greatly enjoy fresh air after being deprived of it for a while. Similarly the full enjoyment of health, liberty, and so on, depends on a temporary loss and sense of need of these possessions. A rise from a lower point in the scale of activity gives the pleasurable feeling in a less marked form. An increase in bodily vigour, in knowledge, in material possessions, in reputation, and so forth, is attended with a pleasurable sense of expanding activity.

As pointed out by Fechner, there is a certain analogy between the relation of increase of (pleasurable) stimulus to increase of pleasure, and the ratio of increase of stimulus to that of sensation formulated in Weber's Law. The more money ('fortune physique') a man has the greater must be the increase in order that his happiness ('fortune morale') may be appreciably augmented.[1] But the relation is commonly more complicated than this. According to this theory a given amount of new information ought to increase the pleasurable consciousness of knowledge much more in the case of an ignorant than of a wise person. Probably the relation does hold roughly as between childhood and manhood. A new piece of knowledge is more to a child than to an adult because it implies a greater increase of his whole stock of knowledge. At the same time it must be remembered that the pleasure of acquiring a new fact or truth varies directly as the amount of previous knowledge with which it can be brought into connection.

Again, a transition from a state of excessive to one of moderate activity is a common condition of pleasure. The passage from glaring sunlight to a moderate light is accompanied by a distinct sense of relief. When a task either bodily or mental is beyond our powers, anything which lightens it gives a pleasant sense of ease. The removal of hindrances or impedi-

[1] G. T. Fechner, *Elemente der Psycho-physik*, Vol. I., IX., § 6.

ments which have necessitated a painful effort brings pleasure by allowing activity to proceed at its natural pace. All transition from states of over-excitement to modes of quiet activity is agreeable. Even the repose of an organ if unduly fatigued will be a source of pleasure. The rest of the body after prolonged muscular exercise, and of the brain after protracted study gives a distinct feeling of pleasurable relief.

Change in the kind of Activity. In order that an activity may be pleasurable it is not always necessary that it should be preceded by a painful state of craving or of over-exertion An adequate element of change may be supplied by a due variation in the kind of activity. In this way a pleasurable flow of mental and bodily activity may be maintained over a prolonged period, each organ and faculty having its alternate stages of work and repose with a minimum of the pains both of excessive and of defective activity. Here again the effect of the change on the intensity of the pleasure will vary as the amount of the change. A transition from bodily to mental activity, or *vice versâ*, from the exercise of one sense-organ to another, from one train of thought to a fresh and wholly disconnected train, illustrates this effect.

What are known as the pleasures of Novelty are but one illustration of this law of change or Variety. What is new, unfamiliar, or rare, acts, as we have seen, as a very powerful stimulus to the attention, and the mental activity as a whole: it involves a marked change from customary modes of activity. A novel experience in early life, such as the first party, the first visit to the Pantomime, the first journey abroad, calls out new activities of mind, or exercises the faculties in a fresh and unaccustomed way. Hence the peculiar intensity of enjoyment belonging to these first experiences of life. Where the perfect enjoyment of novelty is precluded a modest substitute for it is found in the rarity or infrequency of an experience. The coming holidays are always a pleasant excitement to a boy or a girl at school. Any experience which is disconnected with preceding events, and so comes upon us unexpectedly has something of the same effect.

The dependence of pleasure on change has been fully recognised by ancient and modern writers. The doctrine of Plato that all pleasure is negative, presupposing a preceding state of pain from which it is merely an escape, emphasises this idea of the relativity of pleasurable feeling. Many of our pleasures plainly depend on the removal of a previous state of pain. It is doubtful, however, whether any pleasure owes its existence solely to the circumstance of change or relief. The satisfaction of a craving or a painful desire commonly liberates activities of some kind. On the other hand, the pleasures of repose probably involve a positive source of enjoyment in the setting free of energy for other activities. Thus bodily repose by ending the drain on the energies made by the muscles, favours the pleasurable activity of the vital organs, and the flow of the mental operations.[1]

Dr. Bain singles out certain feelings, Wonder, Novelty, Liberty, and Power, as 'Emotions of Relativity,' since they depend in a peculiar manner on a change of circumstances as their conditions. Thus the delight in liberty is the pleasurable release from restraint. We only enjoy freedom when we contrast the condition with that of restraint, one actually experienced or imagined. Similarly with the pleasures of power, superiority, &c.[2]

[1] The theory that all pleasure is negative, being simply deliverance from a previous state of pain was propounded by Plato, and has been adopted by many of his successors. For an historical account of the theory see Dumont, *Théorie Scientifique de la Sensibilité*, Part I., Chap. I. Those who regard pain and pleasure as the concomitants of a hindrance and a liberation from the same, tend to regard pleasure as something secondary and dependent though positive. See Volkmann, *op. cit.*, II., § 128.

[2] *The Emotions and the Will*, Part I., Chap. IV.

Effect of prolonged painful Stimulation. So far we have been considering the effects of prolongation and of variation of stimulation in relation to pleasure only. But in order to grasp all the conditions on which pleasure depends we must glance at the influence of the same circumstances on our pains.

A painful stimulation if prolonged tends in general to lose its first powerful effect. A patient suffers less from prolonged bodily pain (supposing the cause not to increase), and we all suffer less from worries and troubles when these are permanent and familiar.[1] What is known as the loss or deadening of (painful) sensibility illustrates the same principle. A child often rebuked or laughed at suffers less and less. The frequent application of the painful stimulus induces a state of comparative apathy or indifference. Hence we may say that intense pain like intense pleasure implies a certain degree of change, variety, or novelty.

Accommodation to Stimulus. The effect of prolonged stimulation, whether pleasurable or painful, in diminishing the intensity of the feeling evidently implies a change in the condition of the organ. There is a process of adjustment or accommodation. What is commonly called accommodation of organ to stimulus involves more than this. It implies that a stimulus which at first is distinctly disagreeable may in time become not only indifferent but positively pleasurable. This is illustrated in the acquired likings of the palate, the fondness for alcoholic drinks, bitter condiments,

[1] This tendency is often disguised by the fact that prolonged painful stimulation involves more and more disturbance and therefore cause of pain. Also the memory of previous pains persists and combining with the present tends to augment the whole effect.

and so on. As we shall see presently, the growth of an organ or a faculty implies an accommodation to a greater strength of stimulus, so that an amount of exercise which was at first excessive and painful, becomes pleasurable. In these cases the organ undergoes a permanent accommodation either to a new kind or a new degree of stimulation.[1]

Habituation. One other effect of prolongation or frequent recurrence of stimulation in its bearing on our pains remains to be touched on. As we saw above, in the case of all customary pleasurable stimuli the first intensity is lost. When we become accustomed to our surroundings, our modes of occupation, and even our modes of recreation, these lose their first intense pleasurableness, and become either sources of a comparatively quiet enjoyment, or perhaps indifferent. But on the other hand, the very fact that they are customary has as its further result the attachment or clinging of the mind to them, so that their removal or interruption occasions a painful sense of strangeness and craving. In other words repetition and use have in this case given birth to a corresponding *want.* In this way the effect of the prolongation or frequent recurrence of a stimulus is not only to diminish the positive pleasure connected with its presence, but also to augment the negative pain (craving) connected with its absence. This last part of the effect may be conveniently marked off as that of Habituation.

There is something corresponding to this in the case of prolonged

[1] It is probable that in each case there is a strengthening of the organ, though in different ways.

painful stimulation. The effect of repetition and custom is not only to deaden sensibility and induce apathy so long as the painful stimulus lasts, but to intensify the pleasure when the stimulus is withdrawn. A child used to hard rebuffs will show a keen delight at receiving a kind word. But here the case is complicated by the fact that the frequent wounding of a sensibility tends to destroy it as a whole, that is on its pleasurable and painful side alike. A child habitually treated with harshness tends to become indifferent to others' feelings and behaviour altogether. It is said that the effect of long protracted confinement is to destroy the relish for liberty when it comes. Every feeling requires a certain amount of satisfaction or gratification, that is pleasurable stimulation, for its maintenance as an emotional susceptibility.

The principles of Accommodation and Habituation just touched on tend to limit the action of the principle of Change, Variety, or Novelty. Change is only a condition of pleasure *within certain limits.* So far as the mind is able to accommodate itself to a stimulus originally disagreeable, prolongation of the process of stimulation is a condition of the enjoyment. And so far as the mind comes under the influence of habit, change is productive of pain and not of pleasure.

It is to be observed, further, that many pleasures, those that depend on complex conditions, are only experienced after a certain measure of mental persistence. The beauty of a natural scene, of a melody, and so forth, is only felt after dwelling on it, or after a frequent return and renewal of the impression. Hence all the more refined (intellectual and æsthetic) pleasures involve a limitation of change. The love of variety in its extreme form thus precludes the deeper kinds of enjoyment.

The craving for change, and the clinging to what is customary, are two great opposed principles in our emotional life. The new ceases to delight when it implies a rupture of continuity with the past, the customary type of experience. Our happiness depends on a due adjustment of these conditions. It may be added that different minds have by nature these two tendencies in very unequal measure. Some children are by temperament fond of excitement, variety, novelty. They delight in seeing new faces, in being taken to new houses, and so on. Others cling tenaciously to the old and familiar.[1]

Mutual Furtherance and Hindrance of Activities. One other subordinate principle of pleasure and pain has to be touched on. So far we have spoken of the activity of an organ as though it were something complete in itself and isolated from other activities. But this is not the case. The several organs, brain, sense-organs, muscles, &c., are closely connected one with another. Hence the stimulation of any one has indirect, remote, or extended effects, as well as direct. proximate, or restricted effects. For instance, the stimulation of the ear by a fine musical clang calls into activity not only the auditory centre giving rise to the sensuous pleasure of sound, but other connected centres giving rise to a number of ideal or associated pleasures. Not only so, as has been pointed out in connection with the subject of the physical accompaniments and expression of emotion, every pleasurable or painful mental activity is attended by a still wider range of effects in the shape of modifications of the actions of the vital organs, and the voluntary muscles.

It follows from this close connection of the several nerve structures or organs that the condition of

[1] On the whole effect of change and habit on pleasures and pains alike, see G. T. Fechner, *Vorschule der Æsthetik*, I., p. 251, &c.; II., Chaps. XXXVIII. and XXXIX.

one affects that of the others. When the vital processes of digestion and circulation go on well the cerebral activities are furthered, the thoughts flow freely, and the mind takes on a cheerful tone. Conversely when the mind is cheered by happy thoughts, the organic processes are promoted. On the other hand, an overtaxing or impeding of the activities of any organ, not only leads to a painful feeling in connection with that organ, but interferes with the due pleasurable exercise of the other organs. A striking example of this law is seen in the prostrating effects of intensely painful emotion as terror, and passionate grief. These distressing forms of mental activity enfeeble not only the powers of the brain, but those of the muscular and internal organs.

In general the pleasurable condition of one organ tends to the like condition of the rest. The organism is a harmonious system in which the prosperity of each part furthers that of the other parts. But this, though the general tendency, is liable to certain exceptions. A very powerful mental stimulus may give immediate pleasure, but produce hurtful secondary results. Boisterous mirth enfeebles and exhausts. A sudden shock of joy may be almost as disastrous as a crushing blow. On the other hand, a stimulus may have as its direct result a painful feeling and yet promote indirectly a measure of pleasurable activity. A disagreeable shock (*e.g.*, a loud sound, a cold plunge, a sharp blow) may set in activity somnolent energies and so further pleasure.[1]

[1] The indirect effects of stimulation, namely those on the vital processes, are regarded by Dr. Bain as constituting the leading circumstance in pleasure. Pleasure, according to him, is connected with an increase, pain, with an abatement of the vital functions, *The Senses and the Intellect*, Chap. IV., p. 283. Mr. H. Spencer regards the interdependence of different pleasurable activities as involved in the very conception of an organism or consensus of functions. He goes on further to reason from the doctrine of evolution that the special organs are so constituted that their normal and pleasurable functions must subserve the sum of organic functions which we call life. In other words the pleasurable activity of any organ (*e.g.*, the palate) coincides in general with what is beneficial or life-preserving to the organism. (*Principles of Psychology*, I., § 124, *et seq.*)

Harmony and Conflict among Mental States. Something analogous to this mutual furtherance and hindrance of bodily and mental activity takes place with respect to different modes of mental activity arising at the same time. The mind is a unity in even a stricter sense than the bodily organism with which it is connected. Out of all the aggregate of states connected with the several activities of the moment, only a small fraction rises into the region of clear consciousness. Distinct consciousness approximates, as we have seen, to a single chain of successive mental states. Hence the mind cannot be in two dissimilar states at the same moment. When, then, it is acted upon or affected in two unlike or opposed ways, there arises an effect of mutual conflict, accompanied by a painful feeling of jar or discord. On the other hand, if two varieties of pleasurable activity simultaneously excited are homogeneous and capable of combining, there results a mutual furtherance of the activities, accompanied by a pleasurable feeling of harmony.

The conflict may arise through the sense of an opposition between external circumstances and our inclinations and desires, or of the presence of some obstacle to our activity. A child shut up in a room experiences conflict through the collision of outer circumstances with his desires, inclinations, and recurring groups of mental images (of the playground, &c.). To be disappointed in an expectation means a sense of discord between expectation and reality. On the other hand, when circumstances are seen to answer to desire, when anticipation is fulfilled, and so on, there is a pleasurable sense of harmony.[1]

What is commonly meant by the feeling of conflict occurs when two or more distinct modes of mental activity oppose and interfere with one another. The effect of mental distraction is an example of this. When we are surrounded by a number of persons talking, our attention is drawn hither and thither, and a painful sense of confusion arises. When, on the other hand, simultaneous impressions are connected one with another, a feeling of harmony arises. Other examples of conflict and harmony are the state of doubt and its solution; the sense of contradiction between assertion and fact (or assertion and assertion), and of reconciliation: the conflict of impulses and motives, when inclination draws us at the same moment in different directions, or when inclination and duty are opposed, and the happy convergence of different impulses in one and the same direction of action. As a last illustration may be named the effects of others' sympathy and want of sympathy with us, and of their approval and disapproval of our actions. The absence of sympathy or approval produces a painful sense of difference and opposition analogous to the intellectual feeling of contradiction; while the expression of these feelings results in a pleasant consciousness of agreement and unity.

The Principle of Harmony and Conflict which is adopted in some form by all psychologists assumes the place of the leading law of plea-

[1] Probably the pleasure of rhythm in music and verse depends in part on a continual satisfaction of expectation of a rapid, vague, and half-conscious kind.

sure and pain in the hands of these who connect all feeling with a process of mutual hindrance and furtherance among representations.

The principle has a wide range in our emotional life. Most of our feelings are complex made up of many elements of pleasure, of pain, or of both. A subordinate element of conflict may add to the intensity of a pleasure, by providing the necessary point of contrast. This is true of the feelings with which we commonly look forward to some uncertain good, and look backwards on some lost happiness. It is true, also, of the feelings with which we follow a tragedy. In the emotions of humour and sublimity, again, we are aware of a painful and dissonant element which though tending to rise into distinct consciousness is kept down by the greater force of other representations.[1]

Varieties of Pleasure and Pain: Classes of Feeling. As already remarked, feelings of pleasure and pain fall into two main divisions, those arising immediately from a process of nervous stimulation, more particularly, the excitation of sensory (incarrying) nerves, and those depending on some mode of mental activity. The first (popularly marked off as bodily feelings) as involving processes in the outlying parts of the organism may be called peripherally excited feelings or more briefly sense-feelings. The second being connected with central nerve-processes (in the brain) may be described as centrally excited feelings, or as emotions.

(A) **Sense-Feelings.** Each of these classes may be

[1] The exact nature of the principle of Harmony is a matter of some doubt. Those who regard feeling as necessarily embodied in intellectual activity consider the relations of harmony and its opposite to hold of the representations and not of the feelings themselves. Feelings cannot act one upon another, but only the representations of which they are the concomitants. (See Volkmann, *op. cit.*, § 128, p. 303, and § 131). There is a certain degree of analogy between the emotional appreciation of harmony and the intellectual recognition of similarity or identity. The highest æsthetic feeling, the appreciation of harmonious relations of form, approaches an intellectual act, and in the logical feelings of consistency the emotion attaches itself distinctly to the idea of identity.

subdivided into smaller classes. The sense-feelings may arise from certain changes or disturbances in some part of the organism itself. These are the organic sense-feelings, such as hunger, thirst, feelings connected with increase and decrease of temperature in the skin, &c. Since, as we saw above (p. 110), the sensations of which these feelings are the immediate accompaniments are to a large extent wanting in definiteness of character and unsusceptible of distinct localisation, the several elements of feeling are not easily distinguishable one from another.

The second group of sense-feelings consists of the pleasures and pains connected with the stimulation of the special senses. To these may be added the pleasures and pains of muscular sensation, pleasures of movement, pain of prolonged effort, and so forth. These are much more definitely distinguishable than the organic pleasures and pains, and they are susceptible of localisation. The pleasures of the two higher senses hearing and sight have certain distinguishing marks which bring them into close connection with the mental feelings.[1]

It is to be noted that in the case of the internal organic sensations, painful feeling preponderates over pleasurable. The due performance of the functions of circulation, digestion, &c., gives us but little pleasure. On the other hand, in the case of sensations of the special senses, the pleasurable element becomes

[1] For a good account of the sense-feelings see Nahlowsky, *Das Gefühlsleben* 2nd Ed. p. 99, &c.; Wundt, *Physiol. Psych.*, I., 10es Kap; and Horwicz, *Psychologische Analysen*, 2er Theil, 2e Hälfte, Sect. 6. The organic sensations are classified by Bain, *Senses and Intellect*, p. 104, and by Horwiez. See *Mind*, Vol. VII. (1882), p. 302.

more prominent, and in the higher senses seems to preponderate over the painful element.

Importance of Sense-Feelings. We may dismiss this class of feelings at once with a word or two. They are of great importance for our happiness and misery. More particularly in early life before the emotions are developed they constitute a chief part of the life of feeling. The pains of indigestion, of cold, of hunger, and so on, make up a chief part of the infant's misery. On the other hand, the pleasures of eating and drinking, of warmth, of contact, light and sound, make up most of his happiness.

It is to be remarked further that owing to the close connection between body and mind, the organic feelings have a far-reaching effect on the higher emotional life. An uneasy attitude of body, the pressure or chafing of a garment, or the chilliness of a limb, is quite enough to depress the mental powers, to induce irritability of temper, a disposition to peevishness, and to outbreaks of angry passion. On the other hand, pleasurable states of the body lead to a cheerful, hopeful state of mind. The sum of all the imperfectly discriminated organic feelings at any time constitutes the basis of what is known as the cœnæsthesis or general feeling of well-being, or its opposite, malaise, which has much to do with determining the dominant mental tone or mood of cheerfulness, or depression.

Finally, the sense-feelings as a whole will be found to supply important elements out of which the emotions proper are developed. Thus fear and anger have their rise in the mental reproduction of some organic pain (*e.g.*, the effect of a burn or of a blow). So noble a feeling as love itself may have as its humble origin in the infant's mind a memory of numerous organic pleasures (satisfactions of appetite, of warmth, &c.). The pleasures of the higher senses are taken up into the emotion of beauty.

(B) **Emotions and their Classes.** The higher feelings or emotions clearly fall into certain well-marked varieties of pleasurable, together with the corresponding painful, susceptibilities, such as the pleasures and pains of Self-esteem, Love, and so on.[1] It is the object of mental science to discover the deepest or most essential resemblances and differences among these commonly recognised groups of feeling, and to classify them according to these. No very satisfactory classification has as yet been settled on, and we must content ourselves with taking a few of the best marked varieties and grouping these roughly according to some principle.

The most convenient plan seems to be to arrange them in a series or ascending scale, according to their degree of complexity, or representativeness. If we take as an extreme case the emotions Fear and the Moral Sentiment, this fact of a difference in complexity becomes manifest. Where analysis fails us we may fall back on the order of development of the feelings in the individual life. So far as practicable, then, we shall deal first of all with the simpler emo-

[1] In most cases the pleasurable feeling is specially indicated, the corresponding pain being understood. In the case of Fear, however, the painful feeling is commonly looked on as the positive side, whereas the feeling of restored confidence, and courage, is viewed rather as the negative.

tions involving little representativeness, such as fear, anger, and the earlier forms of love, and then take up the more representative emotions, such as sympathy, and the moral sentiment.

Difficulties of Classifying the Emotions. There are peculiar difficulties in the way of a good scientific classification of the emotions. These difficulties are connected with the very nature of emotion, the way in which it is bound up with a mass of obscure representation. Popular psychology has marked off clearly distinguishable varieties as Love, Anger, and so on, but the feelings thus distinguished often shade into one another and combine in a perplexing way. Thus fear is a different emotion from reverence, yet a trace of it is probably present in this last.

Again it is difficult to find a simple principle of classification. The most obvious one is the distinction between pleasure and pain. But to make this the basis of a classification would be to overlook the numerous and important points of similarity between correlative pleasures and pains, those of love, of self-esteem, and so forth. This may be seen by a glance at one of the most ingenious attempts to classify feelings on this principle, that of the late Léon Dumont.[1]

Another way would be to divide the emotions according to the degree of intellectual activity or representativeness involved. Thus there would be grades of emotion answering to sensation, perception, imagination, and thought. This is the principle followed by Mr. Spencer who arranges feelings, like cognitions, in the following grades: (1) presentative (actual sense-feelings), (2) presentative-representative (actual and revived sense-feelings), (3) representative (revived sense-feelings), and (4) rerepresentative (involving a more complex or abstract form of representation, as the sentiment of property or of justice).[2] Since however one and the same type of emotion, *e.g.*, beauty may be excited under any one of the forms 2, 3, or 4, it is plain that this does not distinguish the emotions according to their qualitative differences.

[1] *Théorie Scientifique de la Sensibilité,* Part II., Chap. I. The author, who regards pleasure as depending on a balance of accumulation and expenditure of force, recognises two groups of pleasures and pains, positive and negative. Positive pains arise from too great expenditure, negative, from insufficient accumulation. Positive pleasures result from increase of excitation, negative, from diminution of expenditure. Among positive pains are such heterogeneous feelings as those of effort bodily and mental, of the hideous, &c.

[2] See *Principles of Psychology,* II., Part VIII., Chap. II.

If we try to arrange the emotions according to the degree of their complexity many difficulties arise. Must we assume that all emotions are developments out of sense-feelings? This seems very doubtful. Certain feelings as surprise, disappointment, seem to depend on the relations between impressions and the reaction of the mind in attention on its impressions, or on the relations between simultaneous or successive mental states. In other words, the very form of mental activity contributes its element of pleasure or the opposite. The fact, too, that the several emotions often combine one with another in a very disguised way makes it difficult to arrange them according to their degree of complexity. As a final difficulty there is the fact that many if not all of the main forms of emotion are in a measure instinctive. These instinctive germs may include the complex results of ancestral experience. And this being so, it is plainly impossible to estimate relative degrees of complexity with any certainty or exactitude.[1]

It seems to follow from all this that it is practically impossible to make a satisfactory scientific classification of the emotions in respect of their complexity. All that can be done is to make a rough serial arrangement, so far as analysis will help us, and supplement this method by following the natural order of development of the emotions in the individual and in the race.[2]

Development of Emotion. The same general laws of mental development which we have found to hold good in the case of the intellectual faculties apply also to the emotions. The feelings are deepened and fixed by exercise, and there is a progress from feelings simple in their composition, involving little mental representation, to feelings complex in their nature, and implying a high degree of representative activity. We will first consider the growth of the emotions singly so far as this is one and the same process in all

[1] Mr. Spencer, who traces all emotions to sense-feelings, those of the individual or of his ancestors, sketches out roughly a scale of complexity in his interesting chapter, 'The Feelings,' *Principles of Psychology*, I., Part IV., Chap. VIII.

[2] The difficulties of classifying the emotions are well brought out by Prof. Bain, *Emotions and Will*, 3rd Ed., Chap. III.; *cf.* Mr. Spencer's criticism, *Essays*, Vol. I., Essay VII. For the common German way of dividing the Feelings, see Horwicz, *Psych. Analysen*, 2er Theil, 2e Hälfte, Sect. 5*a*.

cases. We will then endeavour to trace in rough outline the order in which the several varieties of emotion unfold themselves.

Growth of Emotion. (1) *Instinctive and Hereditary Element.*—It is now commonly acknowledged that the growth of the several emotions cannot be fully explained as the result of individual experience, that is, as a product of sense-feelings. There are instinctive capacities of emotion of different kinds, answering to such well-marked classes of feeling as fear, anger, and love. These emotions arise uniformly when the appropriate circumstances occur, and for the most part very early in life. Thus there is an instinctive disposition in the child to feel in the particular way known as anger or resentment when he is annoyed or injured. It is probable, too, that an instinctive element enters into feelings which may be shown to be to a considerable extent the result of individual experience, such as the moral sentiment.

This instinctive capacity for emotion of a particular kind is not the same in all cases. We find that similar circumstances and experiences do not result in the same intensity of emotion in different individuals; and this shows that children are born with very unequal amounts of native disposition to feel in various ways. The sum of these native or instinctive dispositions constitutes the emotional nature or temperament. It is doubtless connected with physical differences, namely in the structure and mode of working of the brain and nervous system as a whole, together with the muscular system and the vital organs which are concerned in the outgoings of feeling.

There is good reason to suppose that these instinctive emotional tendencies may be referred in part to ancestral experience. Not only does the child possess the germs of the several emotional capacities, but these capacities are called forth in connection with a particular kind of object or excitant. And this seems to show that there are *transmitted associations* in the case, which associations are somehow embodied in the inherited nervous structure. For example, the infant smiles when only a few weeks old at the sight of his mother's face. This seems to imply that there is a transmitted tendency to feel pleasure of a particular kind in connection with this kind of object, the human face. The charm of the mother's face for the child would be explained by saying that it vaguely recalls countless pleasurable experiences of companionship and love in the past development of the race. Again, it seems probable that the child has an instinctive fear of strange men, and of certain animals. And this might similarly be explained as being the transmitted result, and a kind of vague reminiscence, of evils and dangers which the experience of the race has led it to associate with the sight of strangers, and wild animals.[1] The transmission of special emotional tendencies among particular races,

[1] For a fuller account of the alleged facts of instinctive emotional phenomena, and of their interpretation by the principle of inheritance, see G. H. Schneider, *Der menschliche Wille*, p. 211 *et seq.*, *cf.* 60 *seq.* The question of an instinctive fear of animals in children is ably discussed by Preyer, *Die Seele des Kindes*, p. 104, &c. Mr. H. Spencer seeks to show how the several emotional capacities may have been built up through the experience of the race and its predecessors, *Principles of Psychology*, I., p. 491 *seq.*

and families, appears to illustrate the action of certain laws of inheritance in the region of emotion.

(2) *The Effect of Exercise, Experience, &c.*—In the second place, every emotion in its developed form presupposes processes of experience and acquisition in the individual life. The feelings, like the intellectual operations, become perfected by exercise of the native capabilities. This takes place in different ways.

(A) **Strengthening of Activity: Adaptation.** To begin with, since pleasure is the accompaniment of activity of some kind, the capacity for enjoyment increases with the strengthening of the several powers of the body and mind. What is difficult, irksome, and painful at first tends to grow pleasant as practice improves the capability. This is true of the simple sense-pleasures which accompany the exercise of the sense-organs and muscles. As they gain in strength their activities become more pleasurable, or a higher degree of pleasurable activity becomes possible. Similarly in the region of mental activity we find that the intellectual powers become adapted to the strength of the stimulus, or the amount of work required of them. To attend carefully to what is said, to exercise the powers of imagination and thought, become through repetition easy and pleasant instead of difficult and unpleasant.

(B) **Emotional Traces and Dispositions.** Again, every experience of pleasure or pain leaves its stamp, impress, or after-trace on the mind. Just as every single exercise of the powers of attention leaves the mind (and the connected brain-centres) modified and disposed to that particular kind of activity in the future, so every indulgence of a feeling leaves a disposition behind it towards that particular mode of feeling.

Quickening of Susceptibility. One effect of this retention of emotional traces is that the exercise of a susceptibility tends to strengthen or quicken that susceptibility, so that less stimulus is henceforth required to call forth the feeling. A child that cherishes an angry or spiteful feeling in one case is more easily moved to that mode of feeling afterwards. Every response of the mind to what is beautiful, ludicrous, &c., renders it quicker in responding to the same kind of stimulus.

Deepening of Feelings. Another, and closely related effect of this persistence of emotional traces is that every feeling tends to a certain extent to become deeper by repetition. Traces of previous feelings of a like kind mingle with the new feeling; or the new feeling wakens echoes of previous like feelings. In this way, for example, a feeling of gratitude, or of resentment, tends to be deepened. The pain attending the sense of a present injury, the pleasure attending the sense of a present favour, is reinforced by vague revivals of past like experiences. Just as every sense-impression gains in definiteness by a fusion with it of traces of past impressions, so a feeling gains in depth by a coalescence of the traces of past like feelings.

Emotional Revival. As a third result of this persistence of emotional traces we have what is called revived or 'ideal' feeling. After having experienced fear, anger, and so on, in the actual, the child is able when the representative power is sufficiently developed, to represent or imagine the feeling. Thus he can recall a fit of anger, or can imagine himself feeling angry again by supposing himself in new circumstances, and can enter into another's feeling of anger when he sees it expressed. Here, again, we have an effect analogous to the cumulative result of sense-impressions. Just as images become possible through the aggregation of sense-impressions, so ideal feelings become possible through the accumulation of the traces of actual feelings.

(c) **Association of Feeling.** This revival or representation of feeling takes place according to the Law of Contiguity. A feeling of pleasure or of pain is recalled to the mind by the recurrence of the impression, object, or circumstance of which the feeling was an accompaniment. Thus the sight of a muff by calling up the tactual sensations of soft contact, calls up the pleasurable feeling attending this. The presence of a person who has done us a kindness gives us pleasure by calling up in our mind the memory of this kindness.

All revived feeling depends on association with presentations of some kind. We can only recall feelings in so far as we can recall the impressions of which they were the concomitants.[1] The growth of a feeling, as love for a person or for one's country, implies an increased facility of revival. And readi-

[1] This is true in the main, though as we shall see directly feeling does not always involve a *distinct* reproduction of the presentations. Volkmann says that strictly speaking there is no *re*production of feeling, but only a new and imperfect production. See *op. cit.*, § 131, p. 333.

ness of revival depends here, as in the case of presentations, on the intensity of the original feeling, on the firmness of the association with a particular presentation, and lastly on the diversity or range of the associations. A child of an emotional temperament forms strong and numerous associations of feeling with presentations.

Feelings of pleasure and pain become associated not only with the objects which are their exciting causes, but with any collateral circumstances. The feeling is then said to be 'transferred'. A feeling of pleasure or of pain reflects itself on all the surroundings of the moment, and colours our subsequent perceptions and recollections of them. A striking example of this is the growth of likings and dislikings for places where pleasurable or painful experiences have been undergone. A child may conceive a lasting antipathy to a room where something dreadful has occurred. The beginning of a personal dislike in a child's mind may be some quite 'accidental' association of the person with a particular misery. The emotional temperament shows itself in the quickness with which such associations are formed, or, in other words, in the range of this irradiation or reflection of emotion upon objects.[1]

All feelings of pleasure and pain are not equally revivable. The sense-feelings of the higher senses, pleasures of colour, form, tone, &c., are in general more vividly recalled than those of the lower senses, and the organic sense; and emotions, as the pain of a disappointment, the pleasure of success, are more vividly recalled than sense-feelings. These differences turn on the fact that the higher and more revivable feelings

[1] For a fuller account of the action of the laws of association in the region of feeling, see Bain, *The Emotions and the Will*, Part I., Chap. V.

are connected with well-discriminated sense-impressions and percepts whereas the lower feelings are the accompaniments of vague undiscriminated mental states. Individuals differ greatly in their power of retaining and recalling feelings of pleasure and pain. In general, as we might expect, children of a strongly marked emotional temperament who feel intensely, recall their feelings better than others. The sensitive child shrinks from a prospect of pain, and is excited by the anticipation of a joy. But the memory for pleasures and pains does not depend simply on this circumstance. There are children who feel deeply at the time, and yet easily forget their feelings. The child that suffers most from a deprivation does not always remember it longest. Differences in general power of retentiveness will tell here. There seem, too, to be more special differences involved. Thus some appear to recall pleasures better than pains, and others conversely. The former being wont to dwell on pleasure are apt to be hopeful and rash : the latter being disposed rather to keep possibilities of evil in mind are timid and cautious.

(D) **Growth of Composite Emotion.** The emotions in their fully-developed form are composite feelings, made up of many simpler feelings (sense-feelings or simpler emotional states), which combine or coalesce in an aggregate or mass of feeling. The process here is only a more complex form of the processes of retention and reproduction just described. When one object successively excites or otherwise becomes associated with a number of pleasurable (or painful) feelings, the memories of these all adhering to that object combine in a homogeneous mass of feeling, giving rise to what we know as a permanent feeling of liking (or disliking). In this way arise the child's likings for his favourite toys and books, his home surroundings, the hills and woods which are his frequent resort, and his brute and human companions. The more numerous and varied the experiences involved, the greater the volume of the resulting feeling.

This process may be illustrated by the growth of an affection for a person. The child's love for his mother is a very gradual growth. At first it is faint and fitful, and it is only after many experiences that it becomes strong, deep, and persistent. The daily experience of the child gradually invests the mother with pleasurable associations and memories. These become more numerous as life advances and intelligence grows. At first made up largely of revived sense-feelings, the emotion becomes enriched by memories of assuaged griefs, consolations, guidances in times of difficulty, and so on. In its mature form it takes up and assimilates still higher elements, intelligent admiration of the mother's wisdom and skill, and moral respect for her character.

Just as a liking for an object is thus built up out of numerous pleasurable experiences, so a rooted antipathy is commonly developed out of a number of unpleasant experiences. A child's dislike of a place where he is not happy, or of a person from whom he frequently receives unkindness is the cumulative result of the successive painful experiences associated with the object.

When the associations are heterogeneous the resulting feeling will depend on the preponderance of the pleasurable or the painful experiences. Our feelings towards places where we have lived and towards persons are often of this mixed character. A slight admixture of the painful element often tends to deepen a feeling pleasurable on the whole. The father in the parable loved his repentant prodigal son with a special love. Here another principle comes in, the action of contrast between the present and the past, and the resulting feeling of relief.

As already hinted, such a deep complex feeling does not involve a distinct reproduction of the several presentations (circumstances, incidents, &c.), with which it is so closely involved. The very nature of the mental process precludes this. We cannot at the same moment distinctly recall a host of unlike events which happen to be associated with the same object. Thus on revisiting our early home, or on meeting with an old school-fellow, we are dimly aware of a multitude of indistinct images of past experiences. But the representations follow one another too rapidly, and mingle one with another too closely for any one to rise into clear consciousness. The revivals are, however, sufficient for a reinstatement of the associated feelings. Hence, the depth and volume of the emotion.[1]

It seems to follow from this that in the case of inherited emotional associations the transmitted representative element must be of the most indistinct character. Without raising the perplexing question how an individual can have a memory of ancestral experience, that is of experience not entering into his personal life, we may say that the very number of the experiences, as well as the remoteness in time of the majority of them, would preclude any approach to distinct representation. The representative element here attains its maximum of obscurity.[2]

(E) **Formation of Habits of Feeling.** In this way a habit of feeling, in the narrow sense of the word, is formed. The child who has contracted a permanent liking or disliking for a person, or a place, cannot see or think of the object without experiencing a revival of the feeling. The stronger the feeling, and the closer the relation between the child and the object, the more frequent and habitual will be the flow of the feeling.

The progress of the emotional life, like that of the intellectual, is marked by the fixing of such definite modes or habits. Certain kinds of feeling become recurring, fixed in connection with particular objects

[1] The reader should note the analogy between the process of imperfect revival of the images associated with a general name resulting in a concept, and that of imperfect revival of images associated with one and the same object resulting in an emotion.

[2] Schneider *(loc. cit.)* contends strongly against the idea that representations are inherited. What is inherited is the causal relation between certain perceptions and certain feelings.

or circumstances. Thus the feeling for the home, the different members of the family, the school, and so forth, becomes a frequently recurrent and permanent ingredient of the emotional life.

Now this result implies both a gradual deepening of feeling on the one hand, and a loss of freshness and vividness on the other. Customary or recurring feelings are not vivid. The intensity of feeling belonging to a fresh experience is out of the question here. Children cannot go on maintaining an exuberant tenderness or love for their mother. Use, familiarity, as we have seen, dulls the edge of enjoyment, and may even deaden emotional susceptibility.[1] But this absence of intensity and profusion on ordinary occasions is compatible with great depth of emotion. There is a *potential* intensity in the child's riper love for his mother which shews itself as soon as some unusual circumstance occurs (*e.g.*, meeting her after an interval of separation, receiving some unlooked for kindness from her). What we call a habitual feeling is one which is habitually or customarily called forth in a calm form by a permanent object of the environment, so as to diffuse itself over large tracts of life in a smooth current.

Finally, the formation of habits of feeling means the growth of corresponding emotional needs and cravings. Every recurring mode of activity, by leaving a disposition to that same mode of activity behind it, begets a correlative need. This is a main feature in what we mean by habit. In the case of feeling, the

[1] As an example we may take the frequent effect of recurring religious observances, and of imposing ceremonies and forms generally.

underlying activities (bodily and mental) being set in definite directions, there arises a feeling of uneasiness and discontent when the customary stimulus or vent is wanting. When the activities are regular and periodic, there occurs a periodic craving or desire akin to the natural bodily appetite (*e.g.*, the artificial appetite of the smoker, the various desires for study, social entertainment, &c.). When deep voluminous feelings, as love, acquire a regular flow the want of the customary vent through the loss of the object which excites and 'gratifies' the emotion is the occasion of keen suffering. The intensity and persistence of grief at the loss of a friend measures the depth of the affection, the intensity of its enjoyments (actual or potential), and finally the hold of the feeling over the mind as a habit.

(F) **Formation of General Emotional Dispositions.** The growth of emotion means not simply the permanent adhesion of a mass of feeling to a particular object. It implies further the expansion of emotional susceptibility, and the formation of a disposition to feel in a particular way towards all objects of an appropriate character. As we have seen, every exercise or indulgence of a feeling strengthens the corresponding susceptibility or disposition. A child that has cherished feelings of love and respect for one person, will be more ready to love and respect others. Similarly in the case of feelings of an opposite kind, as defiance. Or to take an instance from one of the higher emotions, the growth of a sentiment of attachment in a child's mind to his natural surroundings prepares the way for a wider æsthetic (or possibly scientific) interest in nature as a whole. In this way general dispositions or tendencies of feeling are formed, the gratification of which grows with experience and knowledge. Such general emotional habitudes, bringing corresponding needs and cravings, constitute what we call the ruling interests and inclinations.

This growth of a general emotional disposition must be distinguished from the impulse of the fickle mind to transfer feeling to new objects. Children are much swayed by novelty, and since retentiveness and association do not yet exercise a strong force in their case, they easily take up with new objects of attachment, transferring all the intensity and exclusiveness of the old liking to the new object. We see this in the sudden transference of their preference from one playmate to another, one teacher to another, and so on. This tendency to fluctuation and dissipation of feeling is no process of growth at all but works against it. Real growth means the addition of general and comparatively faint likings to special and relatively strong attachments. It is to be added that while the particular affection tends to some extent to favour a general affection, the former is in extreme cases opposed to the latter. We all know children, as adults, of intense, narrow, and absorbing affections. This is but one illustration of the opposition between habit in the narrow sense, and growth in the full sense, already referred to (p. 49).

(G) **Growth of Emotion in Refinement.** Other aspects of the growth of emotion may be included under the head, increase in point of refinement. A sense may be said to grow in refinement when it requires a less powerful stimulus to call it into activity, and when it becomes more highly discriminative.[1] Similarly with an emotion. A feeling like affection grows in refinement when it attaches itself to, and allows itself to be called forth by, the less obvious and more subtle aspects of the beloved object (little unobtrusive beauties or excellences of

[1] See above, p. 143.

person and character, &c.). A refined feeling for beauty discovers the out-of-the-way unnoticed charms of nature. This increase in emotional sensitiveness is commonly attended by a progress in *discriminative susceptibility.* The growth of certain emotions or sentiments, as the feeling for beauty and the moral sentiment, is marked by this increase in emotive discriminativeness.

Closely connected with this growth of feeling in discriminative delicacy is its progress in point of clearness. By this is meant that the feeling comes to attach itself to certain aspects and relations of objects. All feeling is at first obscure, being accompanied by no distinct apprehension of its sources, causes, or objects. As intellectual culture advances, however, the mind learns by a process of abstraction to detect the common traits which answer to the feeling. In this manner all feeling becomes intellectualised or illumined, and bases itself on a conscious process of judgment. This result will be seen most manifestly in the case of the higher feelings or Sentiments.[1]

The reader will note that by the processes just described feeling passes through the same principal phases of development as intellect. It is first of all presentative, called forth by actual presentations, then representative, the accompaniment of concrete images, and finally, abstract or rerepresentative, attaching itself to certain abstract ideas. This applies not only to the Sentiments of Truth, Justice, &c., but to the earlier egoistic feelings. Thus a feeling of anger is at first blind,

[1] It may perhaps be said that in the earlier stages feeling underlies knowledge. Thus we know a thing to be good because it pleases us, or a person to be amiable because we like him. In the later stages knowledge comes more and more to underlie feeling. Thus we pronounce a person to be amiable because we discover in him certain qualities of mind and character.

accompanied with little consciousness of self. As the mind develops the idea of self and of its well-being rises into distinct consciousness and becomes the intellectual support of the feeling.

Order of Development of the Emotions. As has been remarked, the emotions appear to unfold themselves in the order of increasing complexity and representativeness. Thus fear and anger precede the feelings of benevolence and justice, because they are much more simple in their composition, and involve a smaller amount and an easier kind of representative activity. Although we cannot trace out the order of growing representativeness into all the details of the emotional history we may show that it is the order of development when looked at as a whole, or in its broad outlines.

Three Orders of Emotion. Looking, then, at emotional development in this way, we may conveniently distinguish between three groups or orders of emotion, constituting successive stages in the progress of the emotional life. First of all come what may be called the Individual or Personal Emotions. By these are meant those emotions which are confined to the individual, depending on some special personal experience or relation to an object. Or to express it otherwise, they all imply a more or less distinct personal reference.[1] Such are the feelings which grow up about the representation of self and its activities, the pleasures of hope, of success, of reputation, &c. Or they attach themselves to objects standing in some special relation

[1] This reference may not always be made consciously; but it is always involved in some degree, and in the case of the fully developed feeling rises into distinct consciousness.

to self, such as the love of a child for his home, or his mother; his antipathy to one who has wronged him, or his feeling of rivalry with another child.

In the second place we have the Sympathetic Feelings. By these are meant participations in others' pleasurable and painful experiences, and kindliness or benevolence of disposition generally. These are purely representative feelings. In sympathy or fellow-feeling with another we have to imagine or represent how another feels. And the sympathetic feelings follow the personal feelings because they presuppose some amount of 'first hand' emotional experience. They are non-personal and common as distinguished from the individual and personal feelings. In sympathy we are engaged with another's experiences or interests, and do not refer to ourselves. Further, they imply no special and restricted relation between the mind which feels and the object which excites the feeling, but may be called forth in a number of minds by the same object (the manifestation of another's suffering).

In the third place we have a group of highly complex feelings known as Sentiments, such as patriotism, the feeling for nature, for humanity. These are commonly brought under three heads, the Intellectual Sentiment, or the attachment to Truth, the Æsthetic Sentiment or admiration of the Beautiful, and the Moral Sentiment or reverence for Duty (including the worship of moral excellence and the feeling for humanity). These emotions in their developed form attach themselves to certain qualities in things or abstract ideas, truth, beauty, moral goodness. They involve a higher form of representativeness than direct sympathy. They depend to a considerable extent on sympathy, and may be said always to involve it in an indirect form. Hence they follow it in the order of development. They are essentially non-personal and common emotions.[1] In admiring a beautiful painting, or in feeling delight at some new scientific truth we are not thinking of ourselves or our own individual interests. The mind is turned wholly away from self and its concerns, and is engaged in a disinterested contemplation of an object. And these sentiments can be participated in by a number. Knowledge or Truth, Beauty and Human Goodness, are common objects of contemplation or thought.

This threefold arrangement is only intended as a very rough one convenient for surveying the phenomena. It is sometimes difficult to say to which class a feeling should belong. For example, a child's love for his mother is compounded partly of personal elements (gratitude for favours) and partly of non-personal elements (admiration of her intelligence, moral esteem, &c.). Similarly the love of liberty commonly involves a mingling of personal feeling, a sense of the value of individual liberty for ourselves, with a sympathetic appreciation of its value for others. Feelings shade off from the one extreme, the purely personal, to another extreme, the purely non-personal. A feeling of liking or disliking towards a person may be largely personal, the reference to self being distinct and prominent, or altogether non-personal or 'disinterested'. The growth of a feeling frequently illustrates in its successive stages all these gradations.[2] Again, we have the same gradations

[1] It may be added that Sympathy is less of a non-personal feeling than these sentiments inasmuch as the *object* calling forth the feeling is a personal feeling.

[2] Where, as is often the case with affection and antipathy, a non-personal feeling grows out of a personal one, it would seem to lack one of the characteristics of the former class, viz., unrestrictedness. But if we consider a feeling in itself and apart from its origin we may say that it takes on the appearance of an unrestricted one in the measure in which it detaches itself from all reference to self, and attaches itself to the representation of an object as something intrinsically agreeable or disagreeable. The terms subjective and objective would help to bring out the contrast here indicated.

exhibited in feelings of unequal range, as the love of home common to all members of a family, of locality common to all neighbours, and of country common to all copatriots.

It may be remarked that this distinction of personal and non-personal answers in emotion to the difference between the higher and lower sensations in the region of sense-feeling. Organic pleasures (gratification of appetite, &c.) are connected with a particular state of the organism and are limited to an individual: the pleasures of light, colour, and sound, are supplied by external objects and are possible to many. Hence, as we shall see presently, their rank as æsthetic pleasures.

It is to be added that in speaking of the egoistic or personal feelings as the earlier we do not mean that they are completely developed before the others. The feeling for self only attains its perfect development after the idea has become distinct; and as we saw when tracing its growth, the formation of this idea belongs to the higher and more difficult stages of abstraction. The three groups of feeling here distinguished, do, however, in their beginnings and earlier forms answer to successive stages of emotional development.

Characteristics of Children's Feelings. As we have seen, children's feelings are limited by their experience and their power of mental representation. Their joys and griefs are all related to what is present, or what is immediately behind or before. Among these early feelings the sense-feelings occupy a foremost place. The alternation of sensations of hunger and its appeasement, of impeded and prosperous digestion, of cold and warmth, of impeded and unimpeded movement, and so forth, serves largely to determine the young child's outbreaks of passionate misery, and of exulting joy.

Feeling being thus dependent on presentations is apt, on the one hand, to be violent and absorbing while it lasts, and, on the other hand, to be transitory and soon forgotten. The very feebleness of memory and anticipation exposes the child to the full force of the present. The pain caused by a blow, or by the taking away of a toy, fills the whole mind at the time. Hence the violence of passion and the emotional abandonment which we never see in later life. As soon, however, as new objects or new suggestions are presented to the child's mind, the torrent of passion is arrested. And so the little sufferer, on whose head there seemed to be heaped but a moment ago an insupportable burden of misery, becomes his usual serene and even cheerful self again.

Earlier Emotions: Egoistic Feelings. The earlier emotions of childhood are largely egoistic or personal feelings. Among these are the hopes and fears excited by the anticipation of good or ill, the pleasures of successful muscular activity, and so on. Children are as a rule timid by nature, and as we have seen, probably inherit definite tendencies to fear. Moreover their want of bodily and mental strength exposes them to special dangers, and so renders them apprehensive. On the other hand, a healthy and vigorous child delights in putting forth his powers, overcoming obstacles, and accomplishing his wishes. He learns, further, at an early stage the meaning of property or ownership, the difference between "mine" and "thine," and takes pleasure in acquiring and in keeping things, such as toys, picture-books, &c.

Anti-Social Feelings: Rivalry. The strongly-marked egoistic character of children's first feelings is seen in their disposition towards others. To begin with, the anti-social feelings, namely, anger, antipathy, envy, feeling of power or love of dominion over others, are strong. A child at a very early date begins to feel the collision between his own wants and inclinations and those of others. In this way the feelings of antagonism, dislike, and envy are aroused. He resists force employed to make him do things, he resents injuries done him, slapping his brother or sister who takes his toys, and so on. He dislikes to see others enjoying things, and under the pangs of envy cherishes a momentary anger towards the more fortunate possessor of what he covets. He loves to domineer over others, to make others the instruments of satisfying his wishes.

The pleasures of mere activity and of successful effort are largely reinforced in early life by the feelings of emulation or rivalry. By these are meant in part the enjoyment attending the strenuous activity which competition calls forth. More than this, rivalry implies antagonism, the situation of opposition, and some degree of those feelings of anger or malevolence which belong to this situation. It is this which gives the zest of animal excitement to all contest and competition. Finally, rivalry has for its crowning pleasure the delight of victory, which is not simply the pleasure of success, but involves a distinctly anti-social element, viz., the pleasurable sense of superiority to another, of discomfitting and humiliating another. The impulse of imitation, so strong in childhood, is as we shall see by and by closely related to the feeling of rivalry. Children are apt to feel at a disadvantage if they cannot do what they see others perform, and, on the other hand, enjoy a sense of equality when they are able to match their achievements.

Social Feelings of Childhood. The same thing is seen in the first emotions of a social character. Children are from the first social beings. The pleasure in the infant's face when he gazes at the mother attests this. A child goes to his mother for companionship, for the expression of interest and sympathy in his doings and concerns. A boy of 16 months showed this desire for sympathy in his pleasures. When he saw anything which delighted or amused him, he used to touch his mother's face, and try and turn it in the direction of the object. The proximity of the mother or nurse evidently gives pleasure. He is happy when at her side engaging as much of her attention as possible, and occasionally indulging his young love by a warm caress. On the other hand, he is miserable when long away from her, whether alone or with strangers. The very dependence of childhood on parental care forms a bond that binds the child to his mother. But this early affection is largely a personal and interested feeling. The child feels the mother or playmate to be necessary to him. He values them as sources of pleasure to himself. He has as yet hardly any disinterested feeling for their concerns, and as little appreciation of what they are in themselves, and out of relation to himself.

Love of Approbation. One of the most valuable traits of childhood is its strong love of others' recognition, good opinion, and approbation. This is not a non-personal or disinterested feeling. When a child finds pleasure in another's approval he is obviously thinking of himself. It is thus a form of self-love or self-appreciation. The child is pleased (according to the principle of harmony) when others' opinion is favourable, chiming in with his instinctive disposition to think well of himself.

At the same time this feeling is distinct from other personal feelings in one important respect, that it involves a reference to others. To set store by the good opinions of others means that we respect others. Not only so, it implies a vague reference to the *feelings* of others. It is another's pleasurable feeling which is the ground of the self-gratulation in the case, another's painful feeling which is the basis of the self-humiliation or sense of shame. Hence the moral and educational value of this feeling. It is, to use Mr. Spencer's expression, an 'ego-altruistic' sentiment which serves to bind the child to others, and prepares the way for a purely disinterested type of social feeling.[1]

The child has a native disposition to value others' approbation. This is connected with the instinctive tendency to value and extol self and its concerns. It is not improbable too that long experience of the utility of other's favourable opinion in the history of the race has brought about an inherited disposition to attach particular importance to the opinions and sentiments of others. However this be the experience of life will soon shew to a child how much his daily happiness depends on the favourable judgments of his parents, teachers, and (to a less extent) those of his play-fellows.[2]

Pride, Self-Esteem, &c. The crowning phase of

[1] For a fuller account of this feeling in relation to the emotion of self-love see Bain, *The Emotions and the Will*, Pt. I., Chap. XI., §§ 10-17.

[2] For an account of the way in which such a feeling may have been evolved in the history of the race see H. Spencer, *Principles of Psychology*, II., Pt. VIII., Ch. VII.

this egoistic stage of feeling is the development of a distinct emotion of complacency with respect to self. The love of self, the disposition to value self and its concerns, is, as has been observed, instinctive, and connected with the impulse of self-conservation. But in this early form it is unreflective and 'unconscious'. In its developed form it involves difficult intellectual processes of inner self-reflection, and so appears later than the love of others' approbation.

This latter feeling contributes in no small measure to the growth of the former. Just as the talk of others about the child does much to lead him to reflect on himself, so the feeling of self-complacency or self-approval is fed and nurtured in no small measure by experiences of others' good opinion. The child first feels satisfied or dissatisfied with himself in direct response to the utterance of others' satisfaction or dissatisfaction. On the other hand, children who experience little of others' favourable opinion are as a rule wanting in self-complacency and self-confidence. The young are thus, morally as well as physically, dependent on others.[1]

As however a child's powers unfold themselves, and he learns to reflect about himself and his concerns, distinct feelings of self-satisfaction and self-approval arise. The very instinct of self-preservation would, as just remarked, further the growth of self-esteem. And where circumstances are favourable,

[1] Dr. Bain regards self-love as an extension of tender feeling, properly called forth by the sight of human beings, to one's own personality (*The Emotions and the Will*, Part I., Chap. XI., p. 203). But this applies to only one side of the feeling. It has an independent root in the instinct of self-preservation.

and the child succeeds in accomplishing his daily objects, there grows up in the way already explained a mass of agreeable feeling in relation to himself and his surroundings. The boy feels abreast with his surroundings: he is conscious of progressing in physical power, knowledge, and the accumulation of material possessions. And so there arises in connection with the persistent consciousness of self, a customary mode of agreeable feeling which, viewed in slightly different ways, we call pride, self-complacency, or self-esteem. The customary strength of this plea surable feeling serves to determine to a considerable extent the amount of the individual's happiness.[1]

The sentiment of self-esteem and the idea of self grow together and further one another. The feeling of self-assertion is at first a vague instinctive impulse. And as was pointed out in tracing the growth of the idea of self (p. 376), the feeling is one factor in developing a clear consciousness of self. On the other hand, the distinct idea of self when once attained gives clearness to the pleasurable (or painful) sentiment. Thus the boy's first blind elation of pride in doing something difficult becomes later on a clear consciousness of personal power or excellence.

Cultivation of Emotion. The practical problem of cultivating the emotions is beset with peculiar difficulties. The means of stimulating the intellectual powers of the child lie in the teacher's hand. He can set objects before his eye, communicate knowledge by means of words, and so directly act upon his faculties. But how is he to work on the feelings of the child? It is plain that much less can be done in the way of commanding results in the case of the feelings than in that of the intellect. Moreover the vast differences in emotional temperament among children complicate the problem of cultivating emotion in a peculiar manner.

[1] This is true even of the excess of the feeling. Overweening conceit is probably one of the most certain sources of a pleasurable existence. For a fuller account of the origin of this feeling see my volume, *Illusions*, Chap. XI., p. 319, and following.

Let us see what resources Education has with respect to the culture of feeling.

The culture of the emotions falls into two well-marked divisions, (*a*) the negative culture, and (*b*) the positive culture.

Repression of Feeling. There are emotions which are apt to exist in excess, such as fear, and the anti-social feelings, anger, envy, &c. These must to a certain extent be repressed, and kept within due bounds. The problem of subduing the force of feeling in the young is in some respects a peculiarly difficult one. As we have seen, their emotional outbursts are marked by great violence. Moreover, the great agency by which, as we shall see by and by, the force of emotion is checked and counteracted, namely an effort of self-restraint, cannot be relied on in the case of young children, owing to the feebleness of their wills. On the other hand, the very mobility of the child's mind is favourable to an easy diversion of his attention by a skilful educator from the exciting cause of the passion.

In addition to seeking to subdue the force of undesirable feelings when actually excited, the wise teacher will aim at weakening the underlying emotional sensibilities. In some cases he has to take care that feelings needing repression are not too powerfully excited. A timid child should be shielded to some extent from circumstances likely to excite terror. An envious child ought not to be placed in a situation which is pretty certain to excite this feeling. An emotional susceptibility may to some extent be weakened and even 'starved out' through want of exercise. Again, feelings may be weakened by strengthening the intellectual side of the child's mind, adding to his knowledge and exercising his powers of reflection and judgment. In this way, for example, groundless terror will be undermined, and the violence of grief and anger mitigated. Finally, the weakening or deadening of an undesirable feeling may often be most effectively carried out by exciting some opposed or incompatible feeling. Thus, every exercise of a feeling of regard for others' good qualities tends to enfeeble a child's conceit. Every exercise in kindness and consideration for others helps to weaken the impulses of anger and envy.

Stimulation of Emotion. What we call the culture of feeling is, however, largely concerned with the problem of awakening and strengthening desirable and useful emotions, such as affection, the sense of duty, and so on. Speaking roughly we may say that as the egoistic feelings require to be weakened, sympathy and the higher sentiments need to be strengthened. Since feeling grows by exercise the problem is how to call forth an emotional susceptibility into full and vigorous play. There are two things which the educator can do here. (1) First of all the child may be introduced to objects, circumstances, modes of activity, which are fitted to excite a particular feeling. Thus objects may be presented, *e.g.*, in a pathetic story, which are fitted to excite his sympathy. Beautiful objects of nature and art may be submitted to his notice, and so the æsthetic feeling of admiration awakened. Noble actions may be narrated to him, and so the moral sense stimulated. Finally, by inducing him (by the application of any motive) to put forth his activities we set him in the way of acquiring experiences, and discovering new modes of pleasure. In this manner an indolent, unambitious child may be roused to activity by a first taste of the pleasures of success, and the delight of well-earned commendation.

(2) In the second place, much may be done by the habitual manifestation of a particular feeling by those who constitute the child's social environment. Children tend to reflect the feelings they see expressed by their parents, teachers, and young companions. This fact will be touched on again when we come to the subject of sympathy. Here it is enough to name it as affording one of the great instrumentalities by which the teacher may to some extent mould or give shape to the growing emotional nature of the child.

In seeking to stimulate the feelings the Educator needs to be on his guard lest he repress what he seeks to foster. This risk is peculiarly great in education owing to the frequent need of stimulating sensibility on its painful side, for purposes of deterring. As was pointed out above, the oft-repeated wounding of any emotional susceptibility tends to deaden it. This is specially the case with a delicate feeling like shame, which as Locke points out "cannot be kept and often transgress'd against".[1]

[1] *Thoughts concerning Education*, § 60.

The Management of the Egoistic Feelings. The problem of the Educator with respect to the egoistic feelings is partly one of repression, partly one of development. There is no doubt that they are apt to exist in excess in children. The mother and teacher have to seek to restrain the violent painful emotions as terror and grief. More particularly the anti-social feelings, angry passion, antipathy, envy, and other unlovely feelings have to a large extent to be stamped out.

Yet the problem is not merely a negative one. The emotions which grow up about self are needful for the child's continued existence and success in the struggle for life. We cannot eradicate them even if we would, and it would not be well to do so if we could. The egoistic impulses may even be deficient and require positive stimulation. There are listless and lethargic children whom it is well to try and rouse to self-assertion. In their case it may be desirable to seek to quicken the feelings of pride, ambition, and (in extreme cases) even the distinctly anti-social feeling of antagonism and delight in beating others. On the other hand, an over-rash child may require a strengthening of the emotion of fear.

Even when there is no natural deficency in these feelings the educator has not so much to repress them as to direct them to higher objects or aspects of objects. He seeks to transform them by refining them. Thus he aims at leading the child up from the fear of physical evil to the fear of moral evil; from the enjoyment of bodily contest to that of mental competition; from pride in the possession of material objects (personal beauty, &c.) to pride in the possession of intellectual qualities, and so forth. This process goes hand in hand with the exercise of the higher and disinterested emotions.

The difficulties of the educational problems connected with the management of the egoistic feelings come out clearly enough in current discussions respecting the proper motives to be appealed to in intellectual education. The way to deal with the feeling or impulse of emulation or rivalry is one of the puzzles of educational science. In its pure form this emotion is an egoistic and anti-social feeling and there is no doubt that among school-competitors it often develops into genuine hatred. A boy from habitually regarding another as his rival, as one who may obtain the prize he covets, and with whom he is called on to measure his strength, comes unconsciously, perhaps, to cherish a special dislike or antipathy towards his opponent. Hence the impulse must be checked.

At the same time, the feeling is far too powerful, as well as too necessary a force to be dispensed with in education. Provided it be kept within due limits, and tempered by kindly generous feelings under the form of a friendly rivalry, it is unobjectionable. The great practical objection to it is its limited range. Rivalry comes into full play in competition for prizes, and other honours. Hence slow and backward children come little under the influence of this feeling. And since clever children may in general be supposed to derive more pleasure from study itself than stupid ones, the application of the stimulus of reward for absolute attainment, looks very much like giving "to him that hath". This points to the need of habitually exercising another feeling, the love of approbation. This acts on all alike, and as a semi-social feeling is of a higher moral value than the feeling of rivalry. Hence the more the educator can appeal to this feeling in the early stage of school-life the better. By uniformly recognising effort made, and progress attained, in other words, relative as distinguished from absolutive proficiency, the teacher is helping to build up a feeling of self-reliance and self-esteem, which when sufficiently developed will make the intellectual industry of the pupil independent of all external stimulus.

APPENDIX.

For a fuller account of the emotions in detail, see Dr. Bain's volume, *The Emotions and the Will.* The reader of German should look at Dr. J. W. Nahlowsky's work, *Das Gefühlsleben* (Leipzig, 1862); also Dr. L. George's *Lehrbuch der Psychologie* (Berlin, 1854), Part I., § 5 and 6, and Part III., § 4; and A. Horwicz's *Psychologische Analysen,* 2er Theil, 2e Hälfte. For an account of the way in which the Feelings are developed, see along with Bain's work, Herbert Spencer's *Principles of Psychology,* Vol. I., Part IV., Chap. VIII.; and Vol. II., Part VIII., Chap. II., VI., VII.

On the educational problem, see Bain, *Education as Science,* Ch. III. (Play of Motives:—the Emotions). On the general problem of cultivating emotion, see Th. Waitz, *Allgemeine Pædagogik,* 2ter Abschnitt, p. 140, &c.

CHAPTER XII.

THE COMPLEX FEELINGS: SENTIMENTS.

Sympathy. The transition from the lower level of personal Emotion to the higher plane of non-personal Sentiment, is, as we have seen, effected to a large extent by the development of the capacity for sympathy. By sympathy is meant, as the etymology of the word suggests ($\sigma\upsilon\nu$, with, and $\pi\alpha\theta o\varsigma$, feeling), fellow-feeling or feeling along with others. It is the great force which binds the individual to his social environment (family, school, or nation). In its perfect form it constitutes disinterestedness, or altruistic feeling, a readiness to sacrifice personal comfort and happiness for the welfare of others.

Origin of Sympathy. Contagion of Feeling. Sympathy with others is based on a tendency to reflect the feelings or emotional states of those about us. In its simplest form this tendency shows itself in an unconscious reproduction or imitation of another's feeling. The mind of the person affected does not consciously represent or dwell on the feeling which affects him, but simply vibrates in unison with it.

This tendency manifests itself very early. There is possibly some instinctive knowledge of the signs of feeling, and, connected with this, a native disposition to answer smile with smile, &c.[1] But some amount of individual experience is needed for fixing the connection between the several feelings and their external expressions. When this is acquired the child tends automatically to take on the moods of hilarity, anxiety, depression, of those about him. This appears to be due to the working of an imitative impulse which leads to the more or less complete adoption of the external attitude, gesture, tone, &c.[2] When surrounded by a number of people all manifesting the same kind of feeling, there is a strong disposition to fall in with or echo their emotion. A child suddenly placed in the midst of a group of merry children catches the prevailing tone of gladness. The spread of a feeling of indignation, or of admiration, through a community, as a school, or a nation, illustrates this tendency of a strongly manifested emotion to reflect itself in others. This fact is known as the contagion of feeling.

Nature of Sympathy. In its fully-developed form sympathy is more than this resonance or imitative reproduction of a manifested feeling. It implies a distinct representation of another's pleasure or pain, and a disposition to make it our own, or to identify

[1] That the child has a vague intuitive knowledge of others' feelings seems shown by the fact that he responds to the smile of his mother long before his own experience could have taught him to associate pleasurable feeling with this particular facial movement. This is well maintained in the work already referred to, *The Alternative*, § LXXII.

[2] For an explanation of the genesis of sympathy on evolution principles, see H. Spencer, *Principles of Psychology*, Vol. II., Pt. VIII., Chap. V.

ourselves with the subject of it. It is feeling *for* as well as *with* another. Inasmuch as it includes mental representations of others' inner experiences, it is closely related to the knowledge of other minds. But it is more than knowledge, for we may recognise the existence of suffering and yet not enter into it and suffer with and for the sufferer.[1] Although we commonly have in view feeling for pain rather than for pleasure when we talk of sympathy, this last really includes both. To sympathise is to weep with those that weep and to rejoice with those that rejoice. It includes the disposition to felicitate as well as the disposition to commiserate.

Sympathy and Benevolence. Sympathy is a thing of degree. We often feel a momentary feeling for one in trouble, but instantly lose sight of the suffering. Similarly in the case of another's pleasure, This fugitive kind of sympathy is of little moral value as it does not affect action. Sympathy is only complete when it takes a firm hold on the mind, so that we make the suffering which we witness our own, and are disposed to make efforts to relieve it just as though we were ourselves suffering. This complete identification of ourselves with another is implied in kindness, considerateness, or benevolence (well-*wishing*). It is this active side of sympathy, this passing of a mere feeling into disinterested impulse, the desire to relieve another's pain and further his pleasure, which as we shall see later on forms the

[1] The exact connection between fellow-feeling and mutual knowledge has been ingeniously treated by Mr. Leslie Stephen in his *Science of Ethics*, Ch. VI., Sect. II.

foundation of a morally good and virtuous disposition or character.[1]

Process of Sympathy. This feeling for another's pleasure or pain is the result of a process of observation and interpretation of the external signs of feeling. (1) The first step is observation. We must note the facial movements, the modulations of voice, and so on, if we are to be affected by another's joy or grief. Sympathy with adults often requires fine observation, since they are accustomed to conceal their emotions. (2) The second step is the interpretation of the signs by the recalling of our past personal emotional experiences. When we sympathise with a child in his success or his disappointment, we do so by a revival of similar experiences of our own. When another's happiness or unhappiness recalls nothing similar in our experience, we fail to understand, and so to sympathise. (3) Finally, in its higher forms sympathy involves an effort of constructive imagination. The joys and sorrows of others rarely resemble our own in all particulars. In order to interpret another's emotional experience we have to modify, separate, and regroup the elements of our personal experience. We have to imagine an untried set of circumstances, and more than this, allow for differences of emotional susceptibility between ourselves and those whose feelings we seek to share.

Basis of Sympathetic Disposition. From this rough account of the process of sympathy we may easily

[1] The exact nature of this disinterested impulse has been the subject of much discussion. See Bain, *The Emotions and the Will*, Chap. VI., § 12, and following. Leslie Stephen, *Science of Ethics*, Chap. VI., § III. (Altruism).

define the main constituents in the sympathetic temperament. *(a)* First of all, intense and wide sympathies involve the emotional temperament, that is to say a keen and varied susceptibility to pleasures and pains. To feel deeply, readily and widely with others implies that we have felt much and variously ourselves, and are able to recall our feelings easily.[1] *(b)* In the second place, there must not only be high emotional capacity, but also quickness and fineness of observation, a readiness in noting the external signs of others' feelings. This condition is by no means contained in the first. Strong emotional susceptibilities are often accompanied by the 'subjective attitude' of mind, a tendency to brood on one's own feelings, to be introspective and preoccupied with self and its concerns. This is fatal to sympathy. Quick sympathies imply a lively interest in observing external things, and more particularly an interest in the play of feeling in others.[2] *(c)* Finally a sympathetic nature involves imaginativeness. Ready and wide sympathy depends on the ability to project ourselves easily into new circumstances and situations, and spell out from the alphabet of our own emotional experiences the expression of unfamiliar feelings. The want of this sympathetic imagination may render even persons of strong and deep feeling and good observation slow and inept in reading the feelings of others.

To this brief account of the positive (internal)

[1] Differences in retentive power are here overlooked, though of course they affect the disposition to feel for others.

[2] This is a good part of the special interest in faces which underlies a specially good memory for them.

conditions of sympathy may be added a word on the negative conditions. All preoccupation is of course unfavourable to sympathy. A paramount interest in activity (so common in children), in intellectual inquiry, or in art, is inimical to close and deep sympathy. The most important mental obstacle, however, is the presence of some opposite or incompatible feeling, such as the feeling of satisfaction at another's discomfiture, or envy of his happiness. All anti-social feeling stifles the promptings of sympathy. In general, sympathy with pain is much less obstructed than sympathy with pleasure by the uprising of these egoistic feelings. Rejoicing at another's serious suffering (Schadenfreude) is less common than a feeling of dissatisfaction and envy at another's happiness.[1] Hence the great difficulty of a deep and genuine feeling for another's gladness (Mitfreude). As Jean Paul says, "Zum Mitleiden genügt ein Mensch; zur Mitfreude gehört ein Engel."

Effects of Sympathy. The giving of sympathy is partly pleasurable partly painful. To enter into another's joy is a pure pleasure. On the other hand, to sorrow with the sorrowful is to share in a painful state of mind. The pain is no doubt mitigated by an undercurrent of tender emotion, yet it remains. The real pleasure of sympathy is for the recipient rather than for the donor. The happy child has his

[1] It has been contended by Dr. Bain that we are capable of deriving pleasure from the mere sight of another's pain, and that this constitutes the ingredient of sweetness in retaliation. But this position has been questioned. (See *Mind*, Vol. I., pp. 285, 429: Vol. VIII., pp. 415, 562). However this may be, the effect of culture is certainly to greatly limit the range of this gratification.

delight increased by his mother's sympathetic interest: the unhappy one has his grief assuaged by her pity. Sympathy thus increases our pleasure by adding a harmonious resonance, and diminishes our pain by supplying the grateful element of consolation.

More than this, sympathy serves to deepen and fix more firmly our various sentiments and convictions about things. A child who is pleased with a successful effort and disposed to think well of himself has his self-complacency confirmed by the praise of his mother or teacher. His likings both for persons and things, his admirations, his moral sentiments, are all strengthened by finding that others share in his feelings. All our habitual feelings are sustained to a considerable extent by this support of sympathy.

Mutual Sympathy. The giving of sympathy is largely a matter of exchange. The pleasure of receiving sympathy calls forth responsive feeling. We cannot long go on feeling for another if he gives us back no emotional equivalent. Accordingly persons greatly absorbed in their own concerns come in as a rule for little sympathy.

This mutual sympathy may take the form of an exchange of feeling with respect to strictly *personal* joys and sorrows, as in the case of two friends who mutually unbosom their secret happiness or unhappiness. More frequently it enters as an accompaniment into a *common* joy or grief. In the delight of a school at winning a match, or in the sorrow of a family at the loss of one of its members, we see mutual sympathy augmenting a common pleasure or softening a common pain. A good deal of the refined happiness of life consists in interchanges of common feelings and convictions, as political sentiments, æsthetic impressions, and so on. This mutual sympathy is a powerful influence in the direction of maintaining public sentiment and moral tone in a school or other community.

Circumstances favouring Mutual Sympathy. It follows from what has been said respecting the nature of the feeling that warm and close sympathy between two persons depends on special circumstances. It is not enough that both are of a sympathetic nature: more special conditions are necessary.

(1) To begin with, there must be a certain similarity of temperament and emotional experience. Great difference of age, temperament, tastes or mode of life is fatal to close sympathy. The young are proverbially inept in entering into the unfamiliar feelings of the old; and the latter, though they have had youthful experiences, have rarely much sympathy to bestow on the former.

(2) In the second place, there must be a certain amount of daily contact and community of experience. Unless two persons are thrown much together they are not in the way of observing one another's feelings closely. Added to this there is the important circumstance that living together exposes persons to the same external influences, the same causes of sorrow and joy. Children in the same home or same school enjoy to a large extent the same pleasures, feel the same restraints, and so on. Owing to this circumstance they get into the habit of sharing in one another's

feelings, and of giving and looking for sympathy. Against this must be set off the liability of persons living in daily contact to come into a relation of rivalry or competition. This is one reason why children are apt to feel so little for one another's troubles: they are disposed to regard one another as competitors for the same advantages.

(3) As a third circumstance may be named the growth of personal liking. Anything which calls forth tender regard from one person to another secures that vivid attention on which sympathy depends; and, further, a feeling of liking disposes a person to bestow sympathy on the beloved object. Hence the common union of liking or pleasurable regard and sympathy in what we call affection and love. To call forth tenderness, gratitude, admiration, is thus to attract the sympathies. On the other hand, a cold respect, in which there is no warm pulsation of tenderness, is unfavourable to the outgoings of sympathy.

Growth of Sympathy. It follows from this brief account of the nature and conditions of sympathy that it is a comparatively late acquirement. As already remarked there appears to be an instinctive disposition to answer smile with smile, and tears with tears. Mr. Darwin's boy when 6 months and 11 days expressed an imitative sympathy "by his melancholy face, with the corners of his mouth well depressed, when his nurse pretended to cry".[1]

This instinctive tendency needs, however, to be developed and perfected by the aid of experience

[1] *Biographical Sketch of an Infant, Mind,* Vol. II. (1877), p. 289.

and exercise. Sympathy in its complete conscious form, fellow-feeling, first appears as a feeling of pity or commiseration for others. The pains first sympathised with are of course the familiar bodily feelings, such as cold, fatigue, injury, together with the simple emotional states as fear and disappointment. A very young child will show unmistakably the signs of dejection and sorrow at the actual sight or narration of another child's sufferings. And the lower animals with their simple and easily apprehended emotional experiences come in for a considerable share of this early pity. To give an instance, a boy of 21 months on seeing a drowned dog taken out of a pond and buried, burst into tears, and continued for days to talk in plaintive tones of the unfortunate quadruped. Every mother knows how much the interest of nursery stories depends on a gratification of the impulses of pity.[1]

The capability of entering into the pleasures of others is at this early period limited. The child is no doubt agreeably affected by the sight of others' happiness, but this is only an unconscious sympathy which includes no impulse of felicitation. The familiar fact that a young child takes more pleasure in hearing about others' happiness in the region of fiction than in witnessing it in the realm of reality, suggests that the promptings of envy are as yet too powerful. But the exercise of sympathy under the form of compassion strengthens the capa-

[1] Strictly speaking pity is something more than sympathy: it includes an outgoing of tender or loving feeling towards the helpless, or unfortunate creature, and this ingredient is distinctly pleasurable. Hence Mr. Spencer talks about the luxury of pity (*Principles of Psychology*, Vol. II., p. 622).

city and in a measure fits it for the higher task of rejoicing at others' happiness.

The progress of sympathy may be marked in different ways. Every exercise of the capacity tends to fix the disposition and to induce a habit of sympathising. And this is seen in the greater certainty and promptness with which the feeling is called forth.

Again, as the capacity is thus strengthened and the intelligence and representative power grows the child becomes capable of a wider range of sympathy. Sympathy naturally begins at home, with those who have most in common with the child. But as his capabilities unfold he learns to feel not only for those of his own house, but for the poor stranger in the streets, and even the distant slave. In this way a general disposition to sympathy which we call kindness or benevolence is developed.

Finally, the growth of sympathy means a progress in refinement. As the whole emotional nature grows the child becomes capable of entering into the more complex and subtle feelings of others. He began by sharing in the simple distresses of his playmates, and pet animals: he ends by feeling his way into the many shades of emotion which a cultivated mind experiences.

Uses of Sympathy in Education. The impulses of sympathy are a matter of prime concern to the teacher. The fundamental fact of sympathy that feeling tends to propagate itself is fraught with important educational consequences. The maxim that the teacher should exhibit good feeling himself, and cultivate a healthy tone of sentiment in his class or school, depends on this circumstance. In its fuller and more complete form, too, sympathy is a matter of supreme interest. The teacher's success with a pupil will turn largely on his ability to cultivate and maintain a relation of mutual sympathy between himself and his charge. His object should be to stimulate the young learner to enter to some extent into his own feeling of enthusiasm for knowledge, into his tastes, and so on; and for this purpose he should know something of the way in which sympathy is excited. Finally sympathy plays a prominent part in moral development. The child grows moral to some extent by unconsciously imbibing the moral feelings of those about him. But, more than this, sympathy with others is, as we shall see presently, an essential ingredient in the moral sentiment. The disinterested love of right presupposes the capacity and habit of representing and realising the interests and claims of others. It follows from all this that the cultivation of sympathy will occupy a prominent place in intellectual and moral training.

Cultivation of Sympathy. The problem of cultivating sympathy is complicated by the very great differences of native temperament among children. Leaving these out of sight we may lay down one or two general considerations for the guidance of the mother or teacher. To begin with, the capacity for sympathy must be supplied with appropriate stimuli. Objects may be supplied, either in actual life, or, in default of these, in fiction, for the purpose of exciting sympathy.[1] The child should from the first be made familiar with the experiences of others. Since want of sympathy is often due to inadvertency it behoves the teacher to exercise the child in a habit of attending to others' feelings. More particularly he should be prompted to note the effects on others of his own actions. Thus he should be led to see how he wounds and hurts others by his acts of folly and insubordination, by his propensity to self-indulgence. And on the other hand he should be encouraged to note the happy results of good conduct, the comfort and satisfaction he confers on others. Finally the child should be exercised in the following out of sympathetic impulses, that is to say in benevolent actions. He should be encouraged to relieve distress whenever he is able, and to confer happiness on others by giving up

[1] As a part of moral training, that is the exercise of the will in action for the relief of others' distress and the promotion of their happiness, the presentment of ideal objects is of far less efficacy. It tends when resorted to in excess to beget the habit of feeling for others without acting on the feeling.

his toys, books, and so on. This exercise should be gradual, beginning with the sharing of a possession with another, and going on to the more difficult feat of self-denial. In this way he will reach an experience of the delights of sympathy, and have the disposition to sympathise fixed as a ruling motive to conduct.

An important auxiliary agency in the cultivation of a child's sympathy is the manifestation of sympathy with him. Children are at first egoistic and cannot rise to the height of pure unrewarded disinterestedness. Their first outgoings of sympathy are a kind of exchange for similar favours received. Hence they first confer their sympathy on those (as mother and nurse) who are kind and sympathetic towards them. The more the teacher shews kind consideration for his pupil, enters into his special difficulties, troubles, and his favourite interests, the more likely is he to evoke a responsive sympathy. If the teacher wishes his pupil to step up to his level of feeling, he must first descend to his humbler level. In addition to shewing sympathy to the particular child, the teacher will help to cultivate his capacity of sympathy by shewing a kindly disposition in general. Sympathy, like other modes of feeling, is acquired in part through the influence of example. Children brought up in the midst of those who are considerate are themselves likely to grow considerate.

The Intellectual Sentiment: Love of Knowledge. Having briefly considered the nature of sympathy we pass to the consideration of those non-personal emotions or sentiments which gather about certain objects and ideas common to all. Of these the first is the Intellectual Sentiment or the pleasurable feeling which attaches itself to knowledge and truth, together with the corresponding painful emotion which connects itself with ignorance and error. This sentiment is developed in connection with the pursuit of knowledge. Viewed under slightly different aspects it is known as the satisfaction of curiosity, the pleasure of discovery, and the reverence for truth.

Pleasures of Knowledge Analysed: Delight in New Knowledge. All mental activity is as we have seen pleasurable provided it is suitable to the strength of the faculty and to the condition of the brain at the time. Intellectual occupation of all kinds is thus within certain limits agreeable. But the enjoyment only becomes considerable when the charm of novelty is added. To observe a familiar object, to recall a well-known fact, gives little enjoyment. On the other hand, to exercise the powers of observation on a new object, or to recall an occurrence that seemed forgotten, yields keen enjoyment. Hence all acquisition and discovery of new knowledge is fitted to give pleasure, the enjoyment being greater when the facts or truths contrast strikingly with our previous knowledge. In this case we experience the pleasurable excitement of surprise or wonder. The first introduction of the young mind to the new world opened up by science (*e.g.*, Astronomy, Chemistry) gives a thrill of delightful wonder.

Wonder and Perplexity. The pleasures of knowledge illustrate the effect of contrast in another way. They are greatly intensified by a preceding state of mental distress. To be in the dark, to feel ourselves ignorant, is to have a painful sense of want. The child that is made to feel the misery of ignorance is in the best situation to relish the pleasures of knowledge.[1]

A still better preparation for the pleasures of knowledge than a mere consciousness of ignorance,

[1] This was the Socratic way of seeking to rouse a desire for knowledge in the minds of the contented Athenians.

is a feeling of perplexity and confusion in view of what is strange and exceptional. What is strange, far removed from the ordinary level of our experience, may, as just pointed out, give the mind the pleasurable excitement of wonder. This feeling if excessively indulged in is antagonistic to knowledge. The intense craving for the wonderful, the love of the marvellous, has something of an intoxicating effect, and paralyses the impulses of inquiry. But in its moderate degrees the emotion of wonder is the natural stimulus to further inquiry. Wonder lives by isolating the new fact or circumstance from the familiar order of experience. But such isolation becomes disagreeable through the rise of the intellectual impulse to understand. When on a close and prolonged direction of the mind to a thing it maintains its isolated and strange appearance, the mind experiences a feeling of perplexity. Thus the child first wonders at some striking new fact, say the ascent of a balloon. This gives him the momentary gratification of wonder. But presently he begins to feel curious, and if unable to assimilate the new fact to old ones, he has a disagreeable sense of perplexity. The keener joys of discovery are commonly preceded by a temporary state of mental difficulty, perplexity, or confusion.

Emotion of Wonder. Wonder occupies a peculiar place among the emotions. In its simplest form of surprise at what is new or unexpected it constitutes the simplest form of emotional excitement. Descartes regarded it as the first of all the emotions and placed it at the head of his classification (*Les Passions de l'âme*, Art. LIII.) Dr. Bain gives it a place among the simplest emotions (those of Relativity). And Prof. Wundt regards it as the simplest form of emotional excitement, 'Affect' (*Physiol. Psychol.* II., cap. 18, p. 332). Lastly, according to the observations of Prof. Preyer, surprise is one of the first emotions which are distinctly manifested by the child *(Die Seele des Kindes,* p. 108, *seq.).*

The emotion of wonder is a more complex mental state than the feeling of surprise. The latter is the momentary effect of something unexpected for which the attention is not fully adjusted. Wonder implies a more or less distinct comparison of the object with other objects, with familiar types of experience, and a recognition of a marked contrast with or deviation from these. What is wholly new or unexpected always surprises us, but does not necessarily excite wonder.

According to Dr. Bain Surprise and Wonder are neutral or indifferent feelings. This may be so in certain cases, but it is doubtful whether the conditions are often fulfilled. A certain degree of the shock of surprise, by rousing the attention and the intellectual powers to full activity, is pleasurably stimulating. On the other hand, when the shock is violent it is disconcerting and disagreeable.

Wonder at what is unusual seems, in most cases at least, a distinctly pleasurable emotion, whence the expression 'the love of the marvellous'. The value we ascribe to things on the ground of their rarity points to the pleasurableness of wonder. Even the most repulsive objects, as moral infamy, are redeemed to some extent by the element of pleasurable excitement which they afford by reason of their extraordinary startling character. This pleasurable excitement of wonder frequently combines with æsthetic and other pleasurable emotions in the form of admiration. On the other hand, wonder is related as a disturbing shock to the emotion of fear. What is wholly strange is apt to give us a sense of insecurity. The fear of the dark, which *(pace* Locke) seems to arise in young children apart from the suggestions of others, is probably connected with the strangeness and absence of knowledge belonging to the situation. It may be added that the exhilarating and depressing effect of what is new and unfamiliar varies much with individual temperament.

From this brief account of the feeling of wonder it may be seen that it stands in a peculiar and complex relation to the Intellectual Emotion. In its simplest form of surprise the feeling implies a measure of intellectual activity, fixing of the attention. All wonder, further, implies the exercise of the fundamental function of intellect, discrimination. In wondering we distinguish and contrast. As depending on temporary inability to assimilate and comprehend, it may, as pointed out, oppose further intellectual activity, as we see in the gaping of the vulgar mind at the marvels of the conjuror, &c. But in the case of the inquisitive mind it forms the natural starting point in inquiry. Just as discrimination leads on to assimilation, so the pleasurable excitement of wonder conducts (by way of an after-feeling of perplexity) to the final pleasure of mastering and understanding. Finally, as we shall see immediately, this last assimilative process itself supplies a pleasure very similar to that of wonder.

Pleasures of Assimilation. Every kind of intellectual activity has its own characteristic pleasure. Thus the discrimination of objects, or ideas, one from another gives a quiet satisfaction. The detection of the finer shades of difference, making a greater demand on the intellectual energies, is if not fatiguing a distinctly enjoyable occupation. A more exciting kind of pleasure is obtained from the exercise of the 'assimilating' power, the tracing out of identities amid diversities. This operation gives a peculiar thrill of pleasure which has been called the effect of a 'flash of identity'. The poet ministers to this feeling in his similes by which he brings together widely remote objects or ideas. All understanding of new facts supplies a measure of this enjoyment, which varies with the degree of strangeness or unfamiliarity of the new facts. The more arduous processes of thought, the searching out of analogies, causes, and reasons, are now and again rewarded by the full intensity of this intellectual pleasure.

Pleasures of Discovering Knowledge. The full enjoyment of intellect is only known in those more prolonged operations where the mind is actively searching for some new fact or truth. The passive reception of a new piece of knowledge, even when the pains of ignorance or of perplexity have preceded, gives but little delight compared with the active discovery of it for oneself. A boy who works out unaided a problem in geometry has an amount of satisfaction wholly incommensurable with that of another who has the solution at once supplied him. In this case the full activity of the mind is awakened, trains of ideas pass rapidly through the mind and there is the glow of intellectual excitement. In addition to this there is the pleasure of pursuing an end, the delight of intellectual chase. A certain amount of resistance only stimulates the powers further, and so adds to the zest. At the end there is the joyous feeling of successful attainment of difficulties overcome and of triumph.[1]

Pleasure in Possessing Knowledge. When the knowledge is attained its possession is accompanied by a pleasurable consciousness of power. The mind is aware of being enriched by a new possession. And the new attainment is felt to be a source of strength. It has lessened for us the region of the unknown and obscure, and adds to our self-confidence in confronting the world about us. In many cases, too, the new possession gives us a firmer hold on previous acquisitions. It throws light on facts which were once obscure, it serves to bind a number of fragments of knowledge under some uniting principle. Finally, the new acquisition gives us the pleasurable sense of increased active efficiency. Knowledge is power in the sense that it enables us to act or do things. The consciousness of knowing something involves an agree-

[1] This delight of pursuit is treated by Dr. Bain under the head "Emotions of Action". It enters not only into the pleasures of such active occupations as the chase, exploration of new territories, &c., but into intellectual pleasures and those of beauty and art. Hogarth found the source of pleasure of his 'line of beauty' in a pursuit or chase by the eye. The pleasure of music depends in no small measure on the same principle.

able confidence in our ability to act on it when the time comes.[1]

Other Forms of Intellectual Sentiment: Logical Feelings. Besides the feeling of pleasure which springs up in connection with the pursuit and attainment of knowledge, there are other feelings incident to intellectual processes, which may be styled the Logical Feelings. As we have seen, all doubt is in a measure a painful state of discord, whereas belief is a state of agreeable repose. Statements which run counter to our experience give the sense of contradiction, whereas those which chime in with it are wont to be assented to with a pleasurable sense of harmony.

Closely related to these feelings are those which are excited by inconsistency and consistency of statement. Two incompatible assertions distress the mind by a sense of conflict, whereas consistency in statement pleases by affording the sense of harmony. The transition from a state of mental conflict (whether due to an apparent opposition between statement and fact, or statement and statement) to one of harmony supplies a peculiarly keen satisfaction. A good deal of the interest of scientific research turns on reconciling apparent hostility, on assimilating the new to the old knowledge, with which it at first seems to collide. The feeling of veneration for truth includes a regard for consistency, as well as for accuracy of statement. It is closely related to the moral senti-

[1] This pleasure is of course liable to the effect of the principle of change. It is only intense when the knowledge is fresh. But it may afterwards be revived by contrasting our present state with our past state, or with the present ignorance of others.

ment which attaches to veracity, or the disposition to be truthful.

The Intellectual Feelings are differently treated by different writers. Some, as Volkmann, recognise no special group under this head. Nahlowsky understands by intellectual feelings states of belief or assurance not reduced to clear intellectual apprehensions of truth (*Das Gefühlsleben*, § 16). This answers to the fact that we commonly speak of *feeling* sure of that which we cannot establish satisfactorily to another mind. But though this conception of intellectual feeling brings out the important fact that intense feeling and intellection are opposed, it takes a very inadequate view of the range of intellectual feeling. There is an element of feeling accompanying the clearest logical discernment of a truth. The intellectual, like the other feelings, have their lower blind stage and their higher illumined stage. Wundt includes under Intellectual Feelings all the sentiments, Intellectual, Æsthetic, Moral, and Religious. The first species are marked off as Logical Feelings.[1]

Growth of Intellectual Feeling: Children's Curiosity. Children from a very early age take a certain pleasure in finding out new facts, and obtaining explanations. This is seen in the vividness of their curiosity, which is simply the pleasure of gaining new knowledge taking on the active form of desire. The very novelty of the things happening about them supplies a strong stimulus to their curiosity. But this curiosity is at first a feeble and restricted feeling. A child of three or four who is apt to plague his parents with questions would take but little trouble to find out what he asks for. The inquisitiveness is often momentary only, and if not gratified, leads to no distress of mind. It is also apt to be restricted in its range, directing itself mainly to that which is near at hand, intrinsically striking, or associated with the inquirer's personal interests.

[1] On the relation of the intellectual feelings to the processes of thought see my volume *Sensation and Intuition*, chap. IV., pp. 106-108.

The nature of children's curiosity has probably been greatly misunderstood, alike by those who, from a sentimental tendency to exaggerate the value of the several traits of childhood, are wont to extol this quality, and by those who with a touch of cynicism seem disposed to resolve children's questionings into "a display of egotism". They both appear to fail to recognise that there are two stages of development of the feeling. In the first place, there is the lower or earlier form of curiosity in which there is a vague consciousness that things have their reason or explanation, but little discernment as to what kind of explanation is needed in a particular instance. This curiosity is often apparently satisfied by the mere semblance of an explanation. In the second place, there is the higher and more exacting form of curiosity which presupposes a trained intelligence, and a definite antecedent notion as to what kind of explanation is needed in any given case. The earlier and comparatively blind form shades insensibly into the later. An intelligent child of 3 or thereabouts will generally shew that he well knows the difference between a genuine and a counterfeit explanation of any matter with the nature of which his mind is already familiar.[1]

Earlier Stage of Intellectual Sentiment. In the early stages of school life the child's interest in knowledge is due to no small extent to the value which is put on it by others. The boy or girl finds that everybody else is busy amassing knowledge. Progress is rewarded: the children who get up their lessons well are approved, and regarded with favour by their teacher and by their companions. Thus a reflected feeling of respect for knowledge is acquired, which will vary in intensity according to the susceptibility of the child to the pleasures of approbation and reputation. He is proud of knowing his lesson mainly because others hold knowledge in high esteem. Affection and Sympathy will, as we have seen, also play a part. The affectionate child takes to study because he wishes to please his teacher. Moreover

[1] For different views respecting the worth of this feeling, see Perez, *L'Éducation dès le Berceau*, Chap. II., Sect. I.; Bain, *Education as a Science*, p. 90, *seq.*

he finds that his ignorance excludes him from the pleasures of companionship and sympathy, and that every advance in knowledge brings him nearer his teacher. Finally knowledge will be valued for its practical utility. Children set store by those kinds of knowledge which they can turn to practical account. Where, as often happens, the usefulness of knowledge is not apparent they are apt to feel less concern about it.

Later Stage of Intellectual Sentiment. A genuine love of knowledge develops partly as the result of these reflected feelings, and partly through the exercises of the intellect themselves, and experiences of properly intellectual enjoyment. Each enlargement of knowledge supplies a new emotional experience, a fresh taste of the enjoyments of the search for, discovery and possession of knowledge. Through the accumulation of many such experiences a deeper feeling of regard or respect for knowledge is developed.

Here too we see the effects of habit in limiting the range of the feeling. The child comes to value knowledge of certain kinds only, namely, those which are most closely related to his natural tastes, or those which he has made a special object of pursuit.[1] In other words the love of knowledge is not so much an interest in acquiring new information generally, as a special interest in particular subjects, as history, or mathematics. All branches of intellectual pursuit long

[1] The effect of others' estimate, must not be lost sight of here. A child tends to attach special value to those branches of knowledge which he hears extolled.

followed out tend to be made a personal concern, to be identified with the individual's interests. A purely disinterested love of knowledge is more than this, and embraces a feeling of curiosity for knowledge of all kinds, that which lies outside our special region of observation and study, as well as that which lies within it. This wide impartial interest in knowledge is rarely developed in early life. It presupposes a considerable measure of intellectual culture. Even among adults it is one of the rarest attainments.

The development of the Logical Feelings, the sentiment of consistency and accuracy, is a slow process which only begins in the ordinary period of school life. Children often show a certain quickness in spying out inaccuracies and inconsistencies in others' statements, but the interest here is rather the feeling of pleasure in "taking another down," than a genuine intellectual repugnance to contradiction. Such feelings in their keener form are rare, and presuppose a certain refinement of emotional nature to begin with. Their development is closely connected with intellectual progress and the growth of a love of knowledge. A keen desire for knowledge leads naturally to a deep respect for accuracy and consistency. This last is further promoted by a practical experience of the evils of inaccuracy and error.

The Cultivation of the Intellectual Sentiment. The cultivation of the emotions which grow up about knowledge goes on hand in hand with intellectual culture. The best kind of intellectual training necessarily involves the calling forth of a genuine interest in knowledge and of a habitual feeling of curiosity. Here the thing to attend to is to adapt as far as possible the work to the capabilities and natural tastes of the child so that the fullest enjoyment may be derived from it. The pupil must be led (at the outset by the help of adventitious motives) to make acquaintance with the pleasures of intellectual activity, of finding out things, and of overcoming obstacles. A judicious use should be made of the principle of association. All the accompaniments of study should be made as agreeable as possible, so that a pleasurable feeling may be reflected on to intellectual pursuits. The 'get up' of a text-book may materially affect the child's liking for a particular study at this early period. And the more attractive the school surroundings, the more likely are the scholars to take kindly to learning. Further, in seeking to awaken a pleasurable interest in knowledge resort must be had to the principle of contrast. The pleasures of knowledge cannot in themselves be very keen at first but by inducing beforehand a feeling of ignorance, of wonder and perplexity, we may be able to excite a strong impulse of curiosity, the satisfaction of which craving will greatly enhance the pleasure which attends the actual attainment of knowledge. Once more, whenever it is practicable the young should be invited to make their own discoveries in order that they may taste the full enjoyment of intellectual pursuit. A skilful method of instruction will always manage to leave some room for the play of the child's impulse to divine facts, and search out reasons.

The Æsthetic Sentiment. The second of the three sentiments to be now considered is known as the Æsthetic Emotion, the Pleasures of Beauty or the Pleasures of Taste. These include a variety of pleasurable feelings, namely those corresponding to what is pretty, graceful, harmonious, sublime, ludicrous, in natural objects (including human beings) or in works of art. To these pleasures there correspond the disagreeable feelings excited by what is ugly, inharmonious, and so forth.

How Æsthetic Pleasure arises. These pleasures are the accompaniments of impressions made on the mind by external objects through one of the two higher senses, Sight and Hearing, and more particularly Sight. The pleasure arises in connection with the perception or recognition of some agreeable feature or quality in the object. The most general name for this quality is beauty. But this term really answers to a variety of features any one of which may excite this species of pleasure. Thus we speak of the beauty of a colour, meaning its brilliance or purity: of a statue, meaning its graceful lines, and its proportions of form, and so on. These aspects or features of objects have this in common that they excite a peculiar feeling of delight in the spectator's mind. The distinguishing peculiarity of this æsthetic pleasure is that it springs immediately out of the act of contemplation itself and involves no relation (save that of spectator) between the subject and the object. The mother's delight in gazing on her child, even the gem-collector's delight in looking at his treasures, is not a purely æsthetic feeling. As Kant observes, æsthetic enjoyment to be pure must not even include the personal element of a desire to possess.

Characteristics of Æsthetic Enjoyment. From this brief account of the way in which æsthetic pleasure arises we may see what are its leading characteristics: (1) First of all, coming to us through the two higher and intellectual senses, the æsthetic pleasures stand out in contrast to the coarser enjoyments of the senses (such as the pleasures of the table, &c.), as eminently *refined* enjoyments. They are distinguished by their purity or freedom from disagreeable accompaniments (preceding desire or appetite, succeeding satiety), and by their capability of prolongation and variation.

The pleasures of the lower senses are commonly preceded by a state of desire, those of the higher not so. Again in the lower senses the pains are at least commensurate with the pleasures, whereas in the higher they are much less intense. In the case of sight the capability of rapid recovery from fatigue allows of a prolonged stimulation. A further peculiarity of the two Æsthetic Senses is that their impressions are susceptible of grouping in certain pleasing forms, space and time forms. See G. Allen *Physiological Æsthetics*, p. 39, *cf.*, p. 147, *seq* ; E. Gurney *Power of Sound*, Chap. I.

(2) A second characteristic is closely connected with this first. The activities of which these pleasures are the accompaniment are not in any way necessary or 'life-preserving,' such as those concerned in maintaining health, putting down crime, and so on. In contemplating a beautiful object the pleasure springing out of the act of contemplation is its sole end. A work of art is produced solely for the pleasure which it gives. This peculiarity of beauty and art is expressed in the ancient antithesis between the Beautiful and the Useful. Æsthetic enjoyment is thus a net addition to the sum of life's pleasure. It is to the serious business of life what play is to work, something quite useless, and an end to itself.

It is this circumstance which differentiates the Æsthetic from the other two sentiments, the Intellectual and Moral. Though these, too, imply a disinterested attitude on the part of the contemplator they are related to what is useful, for the community if not for the individual. The contemplation of the most abstract truth furthest removed from practical needs approximates to an æsthetic intuition. The modern doctrine of evolution has given a new meaning to the old antithesis of the useful and beautiful by means of the conception of a redundant play-like activity. See H. Spencer, *Principles of Psychology*, II., Pt. VIII., Ch. IX. ; G. Allen, *Physiological Æsthetics*, Chap. III.

(3) The third characteristic of the æsthetic pleasures is their shareability. Since they come to us through the two senses sight and hearing, which can be acted on by objects at a distance, and since they involve no special relation between spectator and object, they may be enjoyed simultaneously by a large number. Hence they are susceptible of great enhancement by the interchanges of sympathy.

Elements of Æsthetic Enjoyment. As has been observed, æsthetic enjoyment arises in connection with the recognition of a variety of features in objects, as, for example, purity of colour, or grace of form and movement. In most if not all cases the pleasure which a beautiful object affords is a complex mass of enjoyment, answering to the presence of a number of agreeable features in the object. We have now to distinguish between these elements of beauty and the corresponding modes of æsthetic enjoyment.

We may in a rough way group the various elements in æsthetic enjoyment under three heads: (1) Of these, the first is the sensuous or material element. Impressions of bright light, of pure colour, of pure even tone, and smooth even lines (whether straight or curved) are pleasurable in their character, and these contribute the sensuous material out of which beautiful objects are composed. A good deal of the charm of visible objects and of series of sounds is due to combinations of pleasurable sense-impressions in such a way as to give ample variety of impression, and agreeable or 'harmonious' juxtapositions of colour, sound, and line.

(2) The second factor in æsthetic enjoyment is the

perceptual or formal element. This ingredient of pleasure is connected with the exercise of the perceptual faculty in following out a variety of details, and in binding these together by some thread of unity. In the case of visible objects the eye traces out pleasing space-form, in its several aspects of free variety of line, symmetry and proportion of form. In the case of sounds, articulate or musical, the ear follows out pleasing time-form under the aspect of free varied movements bound together by the laws of rhythm, metre, tonality, &c.[1]

(3) The third element of æsthetic enjoyment may be marked off as the associative or ideal element. This includes all the pleasure which arises through the suggestions of the objects presented. A good deal of the beauty of natural objects turns on association. The cawing of rooks is not a pleasing sound in itself, but is commonly regarded as such through its suggestions, *e.g.*, sunny park, and country repose. The effect of sublimity is largely a matter of suggestion. We are thrilled at the sight of an Alpine crag because of the suggestions of power, danger, and isolation which attend it. By means of this process of suggestion æsthetic objects supply not only sense-feelings in an ideal form, but also an ideal gratification of the several emotions.

The influence of association on æsthetic impressions is illustrated further in the pleasurable effect of what has been called relative or dependent beauty, viz., that of

[1] For a further exposition of the formal element see my article on *Pleasures of Visual Form* in *Mind*, Vol. V. (1880), p. 191: also *Sensation and Intuition*, Ch. VIII. *(Aspects of Beauty in Musical Form)*, *cf.*, E. Gurney, *Power of Sound*, Chap. IV. and V.

all objects which are seen to be well fitted to their purpose, as a well constructed piece of furniture or tool. The agreeable effect of symbols and emblems of what is worthy or sublime, is also due to a process of suggestion.[1]

The above three-fold division of the elements or constituents of æsthetic impressions is a rough one only, and must not be pressed too far. Strictly speaking, the element here singled out as the formal, namely, a pleasing blending of unity with variety pervades the whole æsthetic impression. Even in the sense-elements themselves the mind is vaguely aware of the presence of uniformity. A mass of pure colour, an even tone, a straight line, all embody a germ of unity.[2] A beautiful curve illustrates uniformity with change. According to the researches of Helmholtz, musical harmony and melody depend on a vague recognition of a partial similarity in the combining elements.[3] And what is known as the harmony of colours consists largely in a discernable colligation of a multitude of elements by a bond of unity.[4] Again, this same ingredient, unity in variety, is discernable in the suggestions or ideal content of the object. Thus the unity in variety of an organic structure, a plant or animal, resides not merely in the space-relations, a beautiful disposition of lines and contours, but also in the utilities or functions of the several parts which are suggested, the subordination of all organs and all activities to one end, the maintenance and furtherance of the structure. Similarly of a beautiful landscape, melody, or poem: the blending of unity with variety appears not only in the grouping of Sense-Elements ('form' in the narrow meaning) but also in that of the represented content or signification of these.

It may be added that association probably enters into the effect both of the sense-elements apart, colours, tones, and lines, and of their combinations. Individual colours and harmonious combinations of these

[1] These suggestions are due partly to the experiences of the individual, partly to those of the race. Mr. Spencer emphasises the influence of heredity on the æsthetic feelings, as those excited by beautiful scenery, music, &c. See *Principles of Psychology* I., Pt. IV., Ch. VIII., §214, II., Pt. VIII., Ch. IX., *cf.*, Darwin's explanation of the emotional effects of music in *The Descent of Man*, Pt. II., Ch. XIX.: also E. Gurney's chapter on 'Association,' *Power of Sound*, Chap. VI.

[2] See G. T. Fechner, *Vorschale der Æsthetik*, I., p. 58.

[3] See *Sensation and Intuition*, Chap. VIII.

[4] See my article on *Harmony of Colours* in *Mind*, Vol. IV. (1879), p. 183, *et. seq.*

owe some of their æsthetic value to pleasurable associations built up during the life of the individual or of the race.[1] The same is probably true of tones of certain timbre. And the æsthetic value of beautiful forms (time and space forms) may to a considerable extent depend on the co-operation of associations.[2]

The whole effect of a beautiful object, so far as we can explain it, is a harmonious confluence of these delights of sense, intellect, and emotion, in a new combination. Thus a beautiful natural object, as a noble tree, delights us by its gradations of light and colour, the combination of variety with symmetry in its contour or form, the adaptation of part to part, and of the whole to its surroundings; and finally by its effect on the imagination, its suggestions of heroic persistence, of triumph over the adverse forces of wind and storm. Similarly a beautiful painting delights the eye by supplying a rich variety of light and shade, of colour, and of outline; gratifies the intellect by exhibiting a certain plan of composition, the setting forth of a scene or incident with just the fulness of detail for agreeable apprehension; and lastly, touches the many-stringed instrument of emotion by a harmonious impression, the several parts or objects being fitted to strengthen and deepen the dominant emotional effect, whether this be grave or pathetic on the one hand, or light and gay on the other. The effect of beauty, then, appears to depend on a simultaneous presentment in a single object of a well-harmonised

[1] See my article already referred to, *Mind*, 1879, p. 191. The effect of heredity in determining the pleasures of colour has been well brought out by Mr. Grant Allen in his work on *The Colour-Sense*.

[2] See the article already referred to, *Mind*, 1880, p. 197, *seq*. *Cf.* Mr. Grant Allen's article on *Symmetry*, in *Mind*, 1879, p. 301, *seq*.

mass of pleasurable material or pleasurable stimulus for sense, intellect, and emotion.

The above analysis of the effect of beauty answers pretty closely to that given by Mr. H. Spencer (*Principles of Psychology*, Vol. II., Pt. VIII., Chap. IX.). The problem of explaining the whole impression of beautiful objects is still far from being completely resolved. By tracing out carefully the many modes of combination of variety and unity, and the different emotional effects of these, much may be done to account for æsthetic impression.[1] But such an analysis still leaves much to be explained. It has recently been argued by Mr. E. Gurney that reason is incapable of discovering any one principle running through all modes of æsthetic impression. The principle commonly adopted as the leading law of æsthetic impression, unity amid diversity, is viewed by this writer rather as determining the broad limits within which beautiful form must move, than as unfolding the nature of beautiful form itself. It is to beauty and art what grammatical rules are to style.[2] The hypothesis of a hereditary transmission of associated effects of tones, colours, and their combinations, if adopted, would account for the large remainder of obscure unanalysable effect in æsthetic impressions.[3]

The Sublime. Among properly æsthetic feelings it is usual to distinguish between the effect of beauty in the narrow sense, in which harmony, unity, proportion is the prominent aspect, from that of sublimity. Here magnitude and not form is the prominent circumstance. We are only affected by the feeling of sublimity in presence of something vast, whether in space, in time, or in degree or energy. The feeling is in general less composite than that of beauty. On the other hand, it involves in most cases a subordinate element of painful feeling. The sublime excites and exhilirates us by presenting a powerful stimulus to perception and imagination. It excites a full measure of pleasurable activity. At the same time, by its very magnitude it baffles a facile

[1] This has been attempted in a thoroughly scientific spirit by G. T. Fechner in his *Vorschule der Æsthetik*, Vol. I., Chap. VI. He seeks to connect this law of æsthetic impressions with a still more general principle of pleasurable mental activity. The analogy between the law of harmony governing the emotional region, and in a peculiar manner, that of æsthetic feeling, and the properly intellectual pleasure of tracing out similarity or identity, has already been touched on.

[2] See *The Power of Sound*, Chap. IX., 'The Relations of Reason and Order to Beauty'.

[3] A historical résumé of the different theories of the Beautiful will be found in the writer's article, *Æsthetics*, in the 9th Edition of the *Encyclopædia Britannica*.

simultaneous grasp of it as a whole. These states usually alternate in looking at a vast and sublime object. In some cases the first, and in others the second predominates. The spectacle of splendid energy (physical or moral) elates us with a sympathetic thrill of expansion. On the other hand, as that which baffles comprehension, which has no sharp boundaries but is undefined, a sublime spectacle usually excites a nascent feeling of fear, or sense of insecurity. We look on the vast space of the starry heavens and on the vast procession of the ages with an emotion of awe. In many forms of sublime spectacle, *e.g.*, mountain scenery, titanic energy, suggestions of danger become still more distinct.[1]

The Ludicrous. Still further removed than the feeling of the sublime from the effect of the beautiful is another variety of æsthetic sentiment known as the feeling of the ludicrous. The sublime like the beautiful is a worthy dignified spectacle: the ludicrous is rather the presentation of something wanting in dignity, in value. The emotion called forth, expressing itself in the characteristic movements of laughter, is quite unlike that excited by either a beautiful or a sublime object. The movements of laughter are an accompaniment of a number of pleasurable feelings. It has properly physical stimuli, more particularly that form of intermittent stimulation known as tickling. In many cases, especially in early life, it seems to be the outcome of a sudden accession of good spirits or gaiety of mind. It seems further to ally itself to a state of mental rebound or relaxation after a constrained attitude of mind, involving the inhibition of movement, *e.g.*, in listening to a discourse. The emotion of the ludicrous, properly so-called, is called forth by the spectacle of what is unusual, odd, or incongruous (provided no other feeling such as fear or disgust is aroused). The effect in this case is by no means clearly understood. There is evidently present in a marked degree the pleasurable exhilaration of surprise (often intensified by expectation of something different). The element of incongruity would seem to be

[1] Writers on the sublime have usually emphasised either the one or the other side of the emotional effect. Thus Burke thought the essence of the sublime was the terrible operating either openly or latently. Longinus and after him many others found the effect in a glorying or sense of inward greatness. D. Stewart, basing his argument on the etymology of the word, looks on the feeling of elation attending an elevated position as the simplest form of the emotion, and an essential ingredient in all its forms (*Philosophical Essays* II.). Dr. Bain regards the sublime of force (and not of space) as the fundamental type, and conceives the essential ingredient of the effect to be a sympathetic consciousness of the power contemplated (*The Emotions and the Will*, Pt. II., Chap. XIV., § 27, &c.). Hamilton recognised both a pleasurable and a painful element in the sublime (*Lectures on Metaphysics*, Vol. II., Lect. XLVI.). Mr. G. Allen has attempted to trace the development of the emotion in the history of the race (*Mind*, 1878, p. 324 *seq.*)

fitted to awaken a disagreeable feeling, namely one of contradiction; but this painful ingredient is instantly overpowered by a pleasurable rebound as the unreality or insignificant nature of the contradiction is recognised. The emotion of the ludicrous properly so-called is usually accompanied by other pleasurable feelings. The most frequent accompaniment is a feeling of power or elation at the spectacle of a slight discomfiture or degradation of a person (or thing) possessing dignity. It also combines with a feeling of tenderness and kindliness in the form of humour.[1]

Æsthetic Feeling and Æsthetic Judgment: Faculty of Taste. We commonly speak indifferently of a feeling for beauty, or of a perception or recognition of beauty. And this shows that the element of feeling is closely connected with a properly intellectual process. The more fundamental fact is that of feeling. An object when perceived gives us pleasure of a certain kind and intensity. We instantly pronounce it beautiful on the basis of this emotional effect. That is we say it is beautiful because it affects us in a certain way. This may be called an automatic or unconscious æsthetic judgment. A conscious or intelligent judgment includes more than this, namely a process of comparison of object with object, and the detection of certain common aspects, such as purity of colour, or elegance of form, which are the specific source of the enjoyment. And this, again, implies a conscious discrimination of these qualities or aspects of things which are beautiful from those which are commonplace, or positively ugly. What we call the Æsthetic Faculty or Taste consists of the combination

[1] The reader who seeks more information on this obscure subject may consult H. Spencer's *Essays*, Vol. I., IV. (Physiology of Laughter); Dr. Bain's treatise, *The Emotions and the Will*, Pt. I., Chap. XV., § 38; also my volume, *Sensation and Intuition*, p. 262, *seq.* The German reader should consult E. Hecker. *Die Physiologie und Psychologie des Lachen und des Komischen.*

of the emotional susceptibility to the pleasurable effects of what is charming, noble, and so on, with the intellectual power of discriminating, comparing, and judging.

Standard of Taste. Taste is proverbially uncertain and capricious ('De gustibus non est disputandum;' 'Chacun à son goût,' &c.) Individuals differ greatly as to their æsthetic likings and preferences. Thus one person likes a dull sage green, while another detests it. One musician prefers Schumann to Schubert, another conversely. These individual differences of taste correspond to native differences of sensibility and of emotional temperament, and to acquired differences due to accidental peculiarities of experience. So far as they exist there is no objective standard of taste.

Such a standard is, however, found within certain limits, by considering what on the whole a given community holds pleasing and æsthetically right. There is a large amount of agreement as to what is beautiful, graceful, and seemly, in a particular society at any one time,[1] and this supplies the proximate standard for each individual. Taste is very much under the influence of the principle of custom and habit already spoken of. We tend to like what we have been used to, to think that what is, is right. Hence each individual tends to fall in more or less with the current æsthetic standard of his country and time.[2] Æsthetic

[1] In order not to complicate the matter differences of school and sect in matters of art are here overlooked.

[2] This tendency to persistence in matters of taste is opposed by the craving for change and novelty. The history of national tastes in matters of dress, house decoration, &c., is one great illustration of this opposition and mutual counteraction of tendencies.

education aims first of all at correcting individual eccentricities and limiting the area of individual difference in the region of taste, assimilating the likings and judgment of each member of a community to those of the whole of which he is a part.

Such a standard, however, is too empirical and confined. A wider range of observation tells us that each nation has its peculiar likings in matters of art. It requires a Scotchman to find either a kilt or bagpipes 'a thing of beauty'. These differences of national taste are in part connected with differences of temperament, natural surroundings and habits of life, and cannot be eliminated. In part they seem to be very much the result of accident, having their origin in the caprice of conspicuous and influential individuals. Hence the need of supplementing the *relative* standard of our own community by an *absolute* standard.

This absolute standard can only be gained by comparing the æsthetic likings and judgments of different communities, and of different ages. In this way we shall be able to separate what is constant and essential from what is variable and accidental in the national taste of our time. As the final stage in this constitution of an objective standard of taste, we have the interpretation of these uniformities of feeling by a reference to psychological principles. Thus, for example, certain preferences in tone and colour combination found to hold good in the Eastern and Western world, and in classical and modern times, would be connected with simple physiological or psychological conditions of pleasure. In this way we should have the objective basis on which to ground our æsthetic judgments.

Good or Healthy Taste. By help of such a line of inquiry as that roughly sketched out we might arrive at the idea of a normal taste. By this is meant what answers to a perfect and healthy nature well adapted to its environment. A normal æsthetic faculty presupposes the common human sensibilities and faculties. This idea would help us to say, in certain cases at least, whether any particular æsthetic judgment was sound, or whether it indicated a good or healthy taste. Thus, for example, we could condemn the Chinese taste for pinched feet or the English taste for pinched waists as bad, because indicating a state of feeling out of harmony with the conditions of life. Similarly, we might pronounce against a preference for dingy over bright colours, because this is a sign of feebleness in the organ concerned.[1]

Refined Taste. We are apt to talk of a good and a refined taste as though these were the same; but this is not accurate. 'A good taste' points to what is common to all (normal) men, 'a refined taste' points to what distinguishes a higher stage of development or culture from a lower, whether among individuals or races.[2] Now we may assume perhaps that culture tends on the whole to the increase of well-being, to the better adaptation of nature to surroundings. So far as this is the case a good and

[1] For a fuller discussion of the way in which we may arrive at a standard of taste see H. Spencer, *Principles of Psychology*, Vol. II., Part VIII., Chap. IV.; also my *Sensation and Intuition*, Chap. XIII.

[2] On the meaning of the term refinement as applied to emotion generally, see above, p. 492.

refined taste coincide. Refinement as contrasted with *coarseness* of taste clearly involves this superiority. A coarse taste is one which finds pleasure in things which pain the fully developed normal man by suggestions of physical pain, immorality, and so forth. But it is allowed by all that refinement may sometimes come into conflict with goodness or healthiness of taste. Refinement as opposed to *simplicity* of taste is not necessarily a mark of a good æsthetic faculty. An 'over-refined' taste, which has lost the relish for simple common enjoyments, as brilliant colour, and invigorating sound, is bad and not good. An ideally perfect taste thus seems to be one that combines to the utmost the common simple pleasures (as those of bright light, and vivid colour) with the more intellectual and subtle delights (as of tone, gradation, harmony in colours). In other words it involves a combination of range and catholicity with delicacy and discriminativeness of taste.[1]

Active Side of Taste: Art-Production. The æsthetic feeling is commonly spoken of as one of passive contemplation which has no relation to active impulse or will. When we look at a beautiful object as a waterfall or a chain of snow-peaks and appreciate its beauty we experience, it is said, no promptings of activity. Nevertheless the feeling for beauty is a powerful motive to action. There exists in the human mind a strong plastic tendency, an impulse to fashion or create objects of beauty for the mere delight of the creator and of others. The fine arts owe their exist-

[1] For a fuller discussion of this relation see G. T. Fechner, *Vorschule der Æsthetik*, I., Chap. XVIII.

ence to this artistic impulse. This creative tendency is connected in part with the powerful natural bent of a vigorous child to activity. When the active powers are no longer engaged in necessary work they find a field for pleasurable exercise in play and art-production (*e.g.*, shaping of figures, or pantomimic representation). With this love of activity there go other and specially artistic impulses or tendencies. These are imitation, or the desire to copy a natural object, action, &c., and the specifically creative impulse, the desire to body forth some new image of beauty, to conceive and realize some new artistic idea. These artistic motives are largely reinforced by the love of display, the desire to shew productive skill, and to outstrip competitors.

Varieties of Fine Art. The working out of this artistic impulse in its various forms has led to the cultivation of the several Fine Arts. Of these the best recognised varieties are five, namely, Architecture, Sculpture, Painting, Music, and Poetry. These may be variously distinguished. Thus we may mark off *(a)* the Visual Arts, namely, those arts which appeal to the eye or make use of visual impression as their material (Painting, Sculpture, Architecture), from *(b)* the Auditory Arts, or those which appeal to the ear, or make use of auditory impression (Music and Poetry).[1] Or we may divide them into *(a)* Imitative Arts, those which imitate natural objects and are greatly controlled by the ends of truth (Painting, Sculpture, and Poetry); and *(b)* Non-Imitative Arts, those

[1] These may be called Space and Time Arts, or, to adopt Lessing's language, arts of the coexistent, and of the successive.

which are more free and in a peculiar sense creative (Music and Architecture). In the imitative arts the element of suggestion or ideality prevails over the formal element: in the non-imitative arts beauty of form is the main thing aimed at.[1]

Connection between Art-Production and Art-Appreciation. The passive contemplation and the active production of works of art are closely connected, and exert a distinct influence one on the other. On the one hand, the fashioning of a statue, or the painting of a picture, has for its end the delight of æsthetic contemplation. And in the process of production the æsthetic faculty is called into full play. In order to paint from nature, to reproduce by aid of the colour-box and brushes what is present to the eye, close attention to colour and form is required. On the other hand, the fact of production makes a difference in our way of looking at a product of art. We do not look at a landscape painting as we look at a real landscape in nature. We regard it as a product, and a good deal of the pleasure which we derive from it is due to the recognition of verisimilitude or truth to nature or life, and to suggestions of the artist's originality and skill in design and execution. It follows then for a double reason that the full development of taste or appreciative feeling for the beauty of art will include a certain degree of familiarity with the processes of artistic production.

[1] Besides these well-recognised varieties, there are other and mixed forms as the histrionic (Pantomime, Drama, Opera), which appeal at once to the eye and the ear. The problem of dividing the Fine Arts has given rise to a great deal of discussion. See the writer's article on *Æsthetics* in the new edition of the *Encyclopædia Britannica.*

Growth of Æsthetic Faculty. The feeling for beauty in its higher form is a late attainment, and presupposes an advanced stage of intellectual and emotional culture. Yet the germ of the æsthetic faculty exists from the first.

The order of development of the æsthetic feeling answers roughly to the above triple division of its elements. The first crude delight in beauty is excited by sense-impressions, as the dance of the sunlight on the wall, the brilliant colouring of a tulip, the sweet sounds of a voice or musical instrument.[1] The feeling for form (symmetry, rhythm, &c.) comes later. And much experience is necessary before the mind is able to enter into the pleasurable suggestions of objects.

While we may thus roughly mark off the sensuous as the first stage, and so on, we must remember that each side of the æsthetic faculty advances concurrently. There is a gradual transition from crude and coarse to refined pleasure, from simple to complex enjoyment. The young child takes pleasure at first only in the more striking and vivid effects of light and sound. Then he begins to note more unobtrusive beauties. His feeling for the sensuous beauties of things develops with his discriminative sensibility. As he learns to distinguish one colour, line, or tone from another, and to appreciate purity of colour and tone, and evenness of line, his pleasures are multiplied and refined. Similarly his appreciation

[1] A boy when only seven weeks old took an odd fancy to a gaily tinted embossed card with gilded border and having the figure of a woman on it, which hung on the wall of the cottage where he was lodging. When carried to the place where it hung he would look up, gaze on it for some time, and smile.

of juxtapositions of colours and sounds, and of relations of form grows in refinement. At first he can only enjoy striking contrasts of colour, but he gradually learns to observe and delight in the more subtle relations of harmony.[1] He begins with admiring simple patterns of a perfectly regular form, and gradually goes on to enjoy more intricate forms of a less obvious regularity. Finally, as his experience widens and his knowledge increases the meanings and suggestions of things grow in richness. A flower acquires a deeper charm as the mind comes to understand its marvellous arrangements of structure and function, the harmonious combination of activities which constitutes its life. And it becomes more valuable as the mind learns from its own experiences and from the reading of poetry to invest it with beautiful associations.

While the æsthetic faculty thus develops on the passive side the active side is progressing too. Children show even in their first year a germ of artistic impulse. They enter into the spirit of playful acting;[2] they exhibit an impulse to fashion or arrange things with their tiny hands. Children's play is a kind of simple art-production. It illustrates the impulse to imitate or copy what is familiar, as well as to construct or shape new forms. In their games children are

[1] The lateness of this attainment (so far as I have been able to observe) bears out the conclusion that harmony of colours is not a simple sense-effect like harmony of simultaneous tones. See my article on the subject, *Mind*, Vol. IV. (1879), p. 172.

[2] Mr. Darwin observes that his boy when about 13 months old shewed 'a touch of the dramatic art' by pretending to be angry and slapping his father for the sake of the agreeable dénoument, a kiss. See *Mind*, Vol. II. (1877), p. 291.

actors, architects, and poets, and sometimes musical composers as well. As their taste, and their powers of execution progress, they derive a greater enjoyment from the production of pretty and tasteful effects. And on the other hand the exercise of these active impulses leads on naturally to a genuine interest in the contemplation of art-products generally.

Again, as a result of the child's æsthetic experience the power of judgment grows in precision and in nicety. The impressions derived from natural objects and works of art supply the material out of which he fashions a standard. Here he will necessarily be influenced largely by custom, and the current maxims of taste of his social environment. As his experience widens, his feeling for what is beautiful will grow in refinement, and as his intellectual powers develop, his æsthetic judgment will grow in clearness. That is to say he will no longer judge this and that to be pretty, funny, and so on, without distinguishing the element of prettiness or ludicrousness, but will consciously refer to some pattern, norm or rule of taste. Not only so, his judgment will improve. His standard will be gradually modified under the influence of growing experience, education, and individual reflection.

This modification will be in a double direction. On the one hand, the standard will be widened and the judgment grow more catholic as the child comes to see beauty in things which once failed to arrest his eye. On the other hand, the standard will be narrowed, and the judgment grow more exacting. As his taste grows in refinement he is less easily satisfied than he used to be. His crude gaudily tinted toys and picture books, his jingling nursery rhymes and melodies no longer satisfy eye and ear. They will grow trivial and common-place just in proportion as he becomes capable of the fuller and more complex delights of genuine art.

The Education of Taste. The full and healthy development of taste implies certain external influences. Among these, education or training plays an important part. Although a mother or teacher cannot implant a faculty of taste if this is wanting, they may do much to 'draw out' and strengthen the natural aptitudes.

(*a*) To begin with, since the æsthetic faculty, like the other faculties, grows by exercise on suitable material, it is important to surround the child from the first with what is pretty, attractive, and tasteful. As far as possible he should be taken out into the fields and woods so as to become familiar with nature's beauties, both sights and sounds. It is only by such early companionship with nature that the most valuable associations which lend so deep a charm to stream, wood, and mountain side can be built up. And in the artificial surroundings of home, neatness and picturesqueness should be aimed at. First impressions produce the deepest effect in the education of taste as well as in that of the other faculties. The influence of a refined mother who studies grace in furniture, pictures, and in her own dress and manner, may be all-important in awaking the first feeling for what is graceful and beautiful. Custom, as has been remarked, plays a great part in determining our standard of what is correct in matters of taste. It is all-important, therefore, to accustom the child at the outset to what, though simple and adapted to the child's sensibilities, is in good taste. By daily familiarity with examples of what is becoming and harmonious in dress, house-decoration, gesture, modulation of voice, and generally what we call manners, a standard will be unconsciously built up by the child, by a reference to which he will afterwards judge as to what is æsthetically right.

(*b*) In the second place much may be done by the mother or other educator by way of directing the attention to what is beautiful, pointing out those aspects of objects which are fitted to please the eye and mind, and so calling the æsthetic faculty into exercise. The training of the sensuous side of the faculty is in itself a considerable work. We all tend to overlook the exact character of sense-impressions, the finer details of colour and line in objects, owing to the superior interest of their suggestions, namely the objects themselves, and their uses, &c. A child looking at a tree-trunk overgrown with moss, or an old wall tinted with lichens and flowers, is wont to think of the tree and the wall as wholes or things, to wonder how high they are, whether he could climb them, and so on. In order to see exactly what is present to the eye, a special interest in sense-impressions and a habit of close attention is necessary. A cultivated mother or teacher may do much to exercise the child's faculty by repeatedly calling off his attention from ideas of doing things, and fixing it in quiet contemplation on the beautiful elements in Nature's sights and sounds.

In addition to calling his attention to what is worthy in the sense-impressions of Nature, the educator should exercise him in noting the beauties of form of natural objects, the symmetry of the mountain, the serpentine windings of the stream, and the beautiful regularities and proportions of crystals, and of organic structures. Lastly, it is obvious that the cultivation of a feeling for art, for painting, music, and so forth, consists largely in this systematic direction of the child's attention to what is beautiful both in the elements (colour, line, sound), in their combinations (symmetrical form, rhythm, &c.), and in the meaning of the whole (what it represents or expresses).

(*c*) In the third place, the faculty of taste should be exercised on its active side. A child's feeling for what is agreeable, refined, or elegant in vocal utterance and expression, gesture, dress, &c., is only fully cultivated when he is led to take pleasure in producing these effects himself. A fine feeling for beauty of colour, line, or sound, is best secured by exercising the child in reproducing what he sees or hears. The teaching of drawing, painting, singing, or other art is the only effective means of developing a fine and discriminative æsthetic faculty.

Great care should be taken not to hurry the process of cultivation. Children who have too refined a standard set before them are apt to affect a taste for what they do not really care about. Young persons should not only be allowed but even encouraged to relish simple æsthetic enjoyments, the charm of brilliant colours, and forcible contrasts of colour, of simple symmetrical patterns, and so on. Great care must be taken not to over-refine their taste, to deaden the healthy instinctive feelings, and so unduly narrow the region of enjoyment.

With respect to the exercise of the æsthetic judgment children should be encouraged to be natural, and to pronounce opinion for themselves. The teacher should never forget the great individual differences of sensibility and taste, and should allow a legitimate scope to independent judgment. Taste is the region which admits of the greatest freedom of opinion, and constitutes, therefore, the best field for the exercise of individual judgment. On the other hand, the child should be taught to express opinion modestly, to avoid dogmatism, and to respect the tastes of others.

The cultivation of the æsthetic sentiment may enter into almost every department of education. On one side it stands in close connection with intellectual training. The feeling for what is graceful or elegant may be developed to some extent in connection with the seemingly prosaic exercises, learning to read and to write; and by this means a certain artistic interest may be infused into the employment. The teaching of the use of the mother-tongue in composition offers a wider field for the exercise of the æsthetic sense in a growing feeling for style. Physical geography may be so taught as to elicit a feeling for the picturesque and sublime in nature, and history, so as to call forth a feeling of admiration for what is great and noble in human character and life. Even the more abstract studies, as geometry and physical science, may be made a means of evoking and strengthening a feeling for what is beautiful (*e.g.*, regularity, symmetry in geometric figure, the beauties of form and colour of minerals, plants, and animals).

On another side the training of the æsthetic sense comes into contact with moral training. To adopt and practise in mode of dress, in speech, and generally in manners, what is agreeable to the æsthetic feelings of others, is a matter of so much social importance that it is rightly looked on as one of the lesser moral obligations. Hence the stress laid in the early period of training on the cultivation of naturalness, ease, fitness, and grace in movement, tone of voice, selection of words, &c.

The full systematic training of the æsthetic feeling will go beyond these exercises and make use of special modes of cultivation in connection with the Fine Arts. Singing, music, drawing and painting, and finally poetry and literature, are the most important instruments of æsthetic discipline.

The question how far the study of art should enter into the ordinary course of education, and what branches of art are of most educational value, raise important practical questions which cannot be fully discussed here, but one or two considerations bearing on the question may be just touched on. Among these, the most important is that of the place filled by æsthetic delight in the whole enjoyment of life. From this point of view the cultivation of music might be regarded as all-important, and this preference might be confirmed by a reference to the socialising and moralising effects of the art. On the other hand, an art like drawing might be preferred on the ground of its value in connection with intellectual discipline and practical training. Perhaps poetry might be placed highest in respect both of the amount of pleasure it brings immediately, and of its intellectual importance. A certain order of artistic culture should be adopted answering to the order of development of the special sensibilities and faculties concerned. Thus, for example, singing may be taught with advantage before drawing, and this again before literary composition.

Ethical or Moral Sentiment. We now come to the last of the three sentiments, that known as the Ethical or Moral Sentiment. This feeling is commonly spoken of under a variety of names, such as the Feeling of Moral Obligation or the Sentiment of Duty, the feeling of reverence for the Moral Law, the Sentiment of Moral Approbation and Disapprobation, the Love of Virtue.

How the Moral Feeling is called forth. The Moral Sentiment has for its proper object conduct or action of a certain kind. It is called forth by a perception of, and reflection upon, actions which we commonly distinguish as good and bad, and more narrowly as right and wrong. These actions may be our own or those of another. We approve what is right in ourselves and in others. Right action may be provisionally defined as that which conforms to the moral law. This law seeks to define and determine the conditions of the common good. It is based on the recognition of the social relations, of the interdependence of individuals, and of the fact that each may in a number of ways further or retard the interests and happiness of others.

It is important to add that the moral feeling is only pure when it is free from all personal reference. A child's regret at wrongdoing, if it means simply a fear of punishment, is personal and non-moral. Similarly his impulse to requite a wrong done by another to himself involves a feeling of personal resentment, and so is non-moral. A genuinely moral feeling approves what is right or good in itself, or merely as right or good, and not because of its bearing on our personal interests.

Peculiarities of Moral Sentiment. From this rough definition of the objects or exciting causes of the moral feeling we may see what are its leading features or characteristics.

(a) In the first place, it is the Social Sentiment in a pre-eminent sense. The love of knowledge and the feeling for beauty imply social relations and common interests. But there is no *direct* reference to the pleasure, interest, or happiness of another in the joys of discovery, or the delight of æsthetic contemplation.

The moral feeling on the other hand contains such a direct reference. The feeling of duty necessarily involves a consideration of others, their interests, and claims. It is in a peculiar sense the sentiment which attaches and binds man to man, the individual to the community.[1]

(b) In the second place, the moral sentiment is characterised by the presence of a feeling of necessity and of obligation. Right conduct is felt to be something which we are not free to do or not to do, but which imposes itself on us with the force of some authority. It includes a distinct reference to a law or command outside of us, to which we owe allegiance or conformity: whether conceived as imposed and enforced by a human or by a divine will; or regarded in a more abstract manner as something independent of all personal volition, a law imposed by the very nature of things. In this way the moral sentiment is clearly marked off from the other two. Knowledge is useful, but we do not feel that we are bound to pursue it, and still less do we feel under any necessity to cultivate beauty and art. This circumstance serves to give the peculiar quality to the ethical feeling, as one of reverence or awe before a superior will, or of subjection to an authority above the individual.[2]

[1] That the moral sentiment involves a distinct reference to others and the relations of the individual to the community must be allowed by all who would distinguish the moral from the religious sentiment. Writers are, however, not agreed as to the exact relation of the moral feeling to social sentiment (benevolence, altruism). See Mr. F. H. Bradley's *Ethical Studies*, Essay VII., p. 248 and following.

[2] The nature of this feeling, and its effect in depressing the feelings of Self (conceit, &c.), are well described by Kant. See *The Metaphysics of Ethics*. Edited by Dr. Calderwood, Book II., Chap. II.

(c) Closely connected with these features of the moral sentiment, is a third, namely its practical character. Having conduct for its object, it is eminently a tendency or impulse towards certain kinds of actions, and away from their opposites. To see and feel what is wrong in ourselves or another is to shrink from it. The thought of what is good, morally worthy and noble, is immediately attended with an impulse of desire or aspiration. The moral feeling thus touches the springs of the will, and instantly sets it in movement. It stands in this respect in antithesis both to the intellectual and to the æsthetic sentiment, and more particularly to the latter, which as we saw involves an attitude of passive contemplation.

Forms of Moral Sentiment. The essential element in the moral sentiment is the feeling of something that ought to be. What is right and good is that which the moral law commands us to do. But this feeling shews itself in a variety of forms. To begin with, it makes a difference whether the action approved or disapproved is our own or another's. In condemning something that we ourselves have done we have the specific pain known as pangs of conscience, sense of shame or remorse. Here the consciousness of self is uppermost: we feel ourselves at variance with the moral law which is above us and commands us. On the other hand, in condemning another's wrong action we are not thus conscious of self. We identify ourselves at the time with the moral law and act as its representatives.

Again a difference in the *nature* of the action as well as in the *subject* of that action affects our feeling towards it. Thus different kinds of bad or good conduct excite different shades of moral feeling. The peculiar sting which enters into the feeling of injustice or unfairness, the element of horror which enters into the moral feeling towards cruelty, the ingredient of contempt which colours the moral feeling for what is base and mean, may be taken as illustrations of this variety of tone in the moral feelings.

Not only so, there is a marked difference between the feeling which is called forth by a bare fulfilment of a well defined duty, such as honesty, and that which is excited by some extraordinary performance of duty, as when a captain keeps to his post in his sinking ship, or by some exceptional manifestation of virtue as the philanthropic devotion of Howard. The former is the comparatively cold feeling of satisfaction with a compliance which is expected and counted upon, the latter contains a warm element of admiration for what is unexpected, rare, and wonderful, and an impulse to reward with praise. Or if the virtuous action be our own, the feeling of bare self-approval is supplemented by the more pleasurable consciousness of moral excellence.

It follows from this that the moral sentiment is allied to other feelings, and more particularly the æsthetic sentiment. It may be said, indeed, that the moral feeling is more complex than the æsthetic, since it commonly involves an element of the latter.[1] To this it may be added that in the ethical feeling for veracity and the corresponding feeling towards falsehood and deceit the intellectual feeling has a place.

[1] On the relation between the two see Mr. L. Stephen's *Science of Ethics*, Chap. VIII., Sect. III. ; also my *Sensation and Intuition*, Chap. X., p. 273, *seq.* Volkmann regards the moral feeling in general as a species of æsthetic feeling, though differenced from other varieties by its direct reference to the ego or subject. See *Lehrbuch der Psychologie*, Sect. 134, p. 353.

Thus the moral sentiment is properly discussed after the other two, as more complex in its structure.

Moral Feeling and Moral Judgment. Here, as in the case of the æsthetic faculty, the emotional element is bound up with a properly intellectual process. Conscience includes not only a susceptibility to feeling of a certain kind, but a power or faculty of recognising the presence of certain qualities in actions (rightness, justness, &c.), or of judging an act to have a certain moral character. Some amount of intellectual discrimination must of course accompany and precede every moral feeling. We cannot feel moral repugnance at an act of meanness or cruelty except when we discern to some extent the character of the action. In some cases, however, the judgment is only a vague unconscious one, and largely based on the fact of feeling. Thus we may have a strong feeling of the injustice of an action and yet be quite unable to say wherein exactly the injustice lies. In contrast to this blind emotive judgment there is the conscious and intelligent one which controls or guides feeling. The full exercise of the moral faculty includes the co-operation of feeling or sentiment and the intellectual faculty of judgment.

The Moral Standard. Men's judgments as to what is right and wrong are not perfectly uniform. We find different standards set up in different communities or in the same community at different times. Thus among Oriental nations we find a standard of morals differing in several respects from our own. The same differences show themselves in smaller communities. In one school current ideas and feelings about what is mean, dishonourable, and so on, may vary considerably from those reigning in another school. Yet in spite of numerous differences there is a large region of uniformity. All men agree (within certain limits at least) that it is wrong to kill, to rob, or to deceive others. The moralist compares different systems of morals with a view to find out what is common to them. He then seeks by reflection on the highest and best interests of man to construct an approximately correct statement of the moral law. Such a construction supplies roughly at least a universal and correct standard of right and wrong.

Origin of the Moral Sentiment. It has been long disputed whether the moral faculty is innate and instinctive, or whether it is the result of experience and education. Writers have been wont to suppose that the authority of conscience would be impaired if it were allowed that it could be developed out of simpler feelings. But this view is less common now than it was. It is recognised that the question of the validity of conscience is to some extent distinct from that of its origin. Even if it is not directly implanted in the child's nature, but has gradually grown up as the result of a process of education, it may still possess all the authority ever claimed for it.

That the moral sentiment is in part instinctive may be allowed. It is probable that as the result of long ages of social experience a habit of feeling and judging in a moral way has been formed, which transmits itself to each new child as an instinctive disposition to fall in with and conform to the moral law. Yet supposing this to be so it remains indisputable that the moral faculty is to a large extent built up in the course of the individual life.

Sources of Moral Sentiment. The common modern doctrine respecting the growth of the moral sentiment may be briefly summarised as follows:—(1) The peculiar feeling of moral obligation or reverence for duty is an outgrowth from simpler feelings. These consist to some extent of egoistic feelings. It is everybody's interest to be good up to a certain point. The purely egoistic feelings, as fear of punishment, aided by the love of approbation, would tend to beget a certain measure of respect for the moral law. But this is not enough. In order that a pure disinterested love of right may grow up in the mind, the social feelings, properly so called, more particularly sympathy, must come into play. A genuine regard for duty springs out of a habit of feeling for others, of caring for their interests, and of making their claims our own.

(2) This development out of simpler feelings of a new type of feeling, what we know as the distinctively moral sentiment, depends upon certain external conditions. It is emphatically the result of social relations and social experience.

The social experience more particularly concerned in this development of a feeling for duty, is of two kinds. In the first place, every member of a community enters from the first into a relation of subjection to some authority as that of his parents, guardian, or tutor. That is to say, commands are imposed on him, and disregard of these is visited with certain penalties. These may be artificial punishments as corporal chastisement, confinement, or more natural penalties as loss of others' esteem with all that this entails. It is argued that this kind of experience is necessary to the formation of a genuine feeling of obligation and of reverence for the moral law. And observation appears to bear this out ; for children who have known little of discipline, restraint, and authority in early life, are as a rule comparatively wanting in a sense of moral obligation.

In the second place, each individual enters into a freer kind of relationship with others. The child finds himself in a family, coming into daily contact with the other members. This daily companionship offers a field for the feelings of rivalry and hostility. At the same time it serves to bind the several members of a household together by community of interests and pursuits, and the bonds of mutual affection and sympathy. It is in this freer kind of social relationship that the individual is supposed to reach an independent regard for the moral law, a feeling for duty for its own sake. It is by the intricate play of individal impulses and wills, as we see it going on in the nursery and playground, that the child comes to recognise the 'solidarity' and interdependence of his own interests and those of his fellows. And it is by such daily intercourse that those social feelings are developed which underlie a pure respect for moral goodness.[1]

Growth of Moral Sentiment : Influence of Authority.

[1] 'The first condition of the development of the moral feeling lies in association (living together) with others and the manifestation of the different relations into which this association brings the individual agent with others.' Volkmann, *op. cit.*, § 134, p. 355.

Let us now briefly trace the successive stages by which the moral sentiment unfolds itself. As we have seen, the respect for the moral law has its beginning in the experience of authority. The parental authority is the first form of moral control. At first the child's repugnance to wrongdoing is little more than the egoistic feeling of dislike to or fear of punishment. By the effect of the principle of association or 'transference' dislike to the consequences of certain actions might lead on to a certain measure of dislike for the actions themselves. Yet it is probable that other forces combine from the first. Children of two years and less, who have had but little experience of punishment, manifest a feeling of deference towards a command impressively laid down. Moreover, as we have seen, the young love the approval of others, and this feeling (though, looked at strictly, an egoistic one) would aid in the growth of a feeling of submission to, and respect for the moral law.

When the forces of affection and sympathy come into play this feeling of respect would be greatly improved in character. An affectionate and sympathetic child finding that disobedience and wrongdoing offend and distress his mother or father would shrink from these actions. A strong affection for the parent who exercises authority is the best guarantee for the growth of a genuine repugnance to wrongdoing as such. Love and reverence for the father lead on naturally to love and reverence for the moral law which he represents, enforces, and in a measure embodies.

Influence of Free Companionship. Even now, however, the love of right is not a feeling for the intrinsic value of right: it is still a blind respect for what is enjoined by certain persons who are respected and beloved (parents or teachers). In order that an intelligent appreciation of the moral quality in the actions enjoined may arise, the child must have the second kind of social experience.

Thrown with others he very soon finds that he is affected in various ways by their actions. Another child takes a toy from him, or strikes him, and he suffers, and experiences a feeling of anger, and an impulse to retaliate. On the other hand, if the other child is generous and shares his toys, &c., with him his happiness is augmented and he is disposed to be grateful. In this way the child gains experience of the effect of others' good and bad actions on his own welfare. By so doing his apprehension of the meaning of moral distinctions is furthered. 'Right' and 'wrong' acquire a significance in relation to his individual well-being. He is now no longer in the position of an unintelligent subject to a command; he steps up to the place of an intelligent approver of the command. Indeed, he takes upon himself the function of administrator of the moral law, and pronounces the doer of the selfish act 'naughty,' and of the kind action 'good'.[1]

This crude and restricted form of moral feeling would be refined by reflection. More experience

[1] The moral feeling has one of its main sources in the feeling of self as called forth by the actions of others affecting the individual, whether beneficially or injuriously. This is well brought out by J. S. Mill in his analysis of the sentiment of justice, *Utilitarianism*, p. 76 *seq*: *cf.*, Wundt, *Physiol. Psychologie*, Vol. II., Chap. XVIII., p. 348.

will teach A the reciprocity of good (or bad) conduct, how the honesty, fairness, and kindness of B, C, D, &c., are conditional on his own conformity to their code of action. In this way he would be led to attach importance to the performance of right actions on his own part. Yet such egoistic reflection would only carry him a little way. In order that he may feel a genuine repugnance for wrongdoing, other feelings, namely the sympathetic, must come more fully into play.

Co-operation of Sympathy. In order to trace the effects of sympathy, let us suppose that A suffers from B's angry outbursts, or his greedy propensities. He finds that C and D also suffer in much the same way. And through his own sufferings he is able to put himself in the place of the injured one and to resent his injury just as though it were done to himself. At the beginning he will feel only for those near him and the objects of a strong affection, as his mother, or brothers and sisters. Hence the moral importance of family affection as serving first to develop sympathy with others and consideration for their interests and claims. As his power of sympathy grows this indignation against wrongdoing takes a a wider sweep, and embraces a larger and larger circle of his fellows. In this way he comes to exercise his moral faculty as a disinterested spectator of others' conduct, or as a representative of (rather than a subject to) the moral law.

Development of Self-judging Conscience. The final outcome of this habit of sympathetic indignation against wrong is a disinterested repugnance to wrong when done by himself. He injures another, say B. His habit of sympathy now makes him suffer with B. He puts himself at the point of view of the injured one, and from that point of view looks back on himself, the doer of the wrong, with a feeling of moral indignation, of self-condemnation. The pain which he suffered before when he did wrong, namely through fear of punishment or of others' condemnation, is now reinforced by a new pain which has sprung out of the sympathetic side of his nature. As representative of the moral law he is compelled by his very habits of feeling and judging to inflict this pain on himself as the subject of the broken law. When this stage is reached, at which the child not merely puts himself under the moral law, but on the side of it, taking up its cause as impartially against himself as against others, he may be said to have a conscience, in the full sense of the word, that is a pure and disinterested attachment to duty.

The moral sentiment and the moral faculty grow by exercise. The feeling of repugnance to wrong in all its forms tends like other emotions to deepen as experience widens, and the evil nature and effects of wrongdoing are realised. In this way the feeling of attachment to a duty like veracity and fidelity to promise becomes stronger and more tenacious with years. The moral judgment too becomes improved by exercise, and so the moral sentiment grows in point of refinement or delicacy. In this way the finer moral distinctions come to be recognised, the real nature of right and wrong to be intelligently apprehended, and what is only seemingly good or bad to be distinguished from that which is so really.

Range of influence of Social Surroundings. It is necessary to add that throughout this process of growth the child is largely dependent on the aid of others. Society aims not merely at enforcing certain laws on the individual, it seeks to win his attachment by appealing to his intelligence and his good feeling. The whole system of moral and religious instruction aims at educating and improving the moral faculty, at removing prejudice, and at leading the young on to a higher view of duty.

It follows that the precise form of the moral faculty will in every individual case be determined to a very large extent by the social surroundings. Thus the quality of the moral discipline which a child undergoes in the home and in the school will be a very important factor in shaping his moral faculty. A lax discipline, combined with over-indulgence, appears to be fatal to the growth of a proper veneration for duty. Next to the effect of discipline in the narrow sense, is that of the prevailing moral sentiments and ideas in the community in which the child lives. These will in part be assimilated by a process of unconscious imitation, though largely enforced by social penalties (loss of esteem and goodwill). Where a high moral tone is kept up and enforced in a school, the growth of the moral faculty is likely to be a healthy one. On the other hand the prevalence of a low standard of morals tends to lower the individual's habitual mode of feeling and judging.

Individual observation and reflection are of course a necessary supplement to this effect of social influence. No high development of the moral sentiment is ever reached except by the aid of such individual reflection directing itself to customary moral rules and maxims with a view to test their intrinsic excellence. Yet in the majority of cases we cannot expect an individual to rise very far above the moral level of his early surroundings.

Religious Sentiment. With the Moral Sentiment is commonly taken the Religious Sentiment. In the mental development of the individual born into a civilised society, the religious feeling commonly takes its rise in close connection with moral discipline. The religious idea is introduced as a supplementary force and sanction on the side of morality. If, however, we look at the development of the religious sentiment in the race, we find that in its earlier forms it is detached from moral feeling, showing itself as a fear or awe of a Power (or powers) governing the operations of nature and human life, and capable of promoting the weal or woe of the individual and the community. The feeling of awe in presence of a mysterious Power, with the accompanying feeling of dependence, is probably the simplest type, as well as the most constant element, of the religious feeling. In its fully developed form the religious emotion assimilates elements from the other sentiments, and so becomes the most complex of the feelings. The feeling for truth reflects itself in the religious sentiment, as the worship of the Omniscient, the source of all human knowledge. The æsthetic sentiment as feeling for beauty finds in the conception of a Being uniting all intellectual and moral perfections the full manifestation of that unity and harmony which is dimly discernable in nature and human character, while as feeling for sublimity, it finds in the conception of the Infinite an object which gathers up into itself and transcends the sublimities of space, time, and force. Finally, the moral sentiment finds in the religious idea the supreme authority and perfect embodiment of the moral law, the ideal of moral excellence, fitted to call forth the strongest impulses of reverent affection.[1]

[1] The nature of the Religious Sentiment and its relation to the moral is discussed by Volkmann, *op. cit.*, Vol. II., § 134, p. 356, *seq.*; and by Wundt *Physiol. Psychologie*, Vol. II., Cap. 18, pp. 349-350. The former views the emotion as distinct from the moral in its origin and early development: the latter finds its source in the moral feelings.

The Training of the Moral Faculty. The problem of exercising the child's moral feelings is clearly connected with that of forming his moral character. As we have seen, the feeling of right and wrong is essentially a practical emotion, bearing directly on conduct, and the educator is chiefly concerned with it as a motive to right action. Here we are concerned with the preliminary problem of rendering the moral feelings quick and vivid, and the moral judgment sound and exact.

It is hardly too much to say that the whole influence of the parent and teacher on the child should be directed to the helping on of the growth of the child's moral faculty. The first thing here is to make the system of discipline under which the child lives as effective and beneficial as possible. Rules must be laid down absolutely, and enforced consistently, yet with a careful consideration of circumstances and individual differences. Only in this way will the child come to apprehend and respect the moral law as a fixed and abiding system, perfectly impartial in its approvals and disapprovals. Much too will depend on the spirit and temper in which discipline is enforced. A measure of calm becomes the judicial function, and a parent or teacher carried away by violent feeling is unfit for moral control. Everything like petty personal spite should be rigorously excluded.

On the other hand, the educator should not be a cold impersonal abstraction. He must represent the moral law, but in representing it he must show himself a living personality capable of being deeply pained at the sight of wrongdoing. In this way the moral educator may appeal to the child's personal feelings of love and respect for himself. The child should be led up to feel how base it is to lie, how mean and cowardly to injure a weak and helpless creature, by witnessing the distress it causes his beloved parent or teacher. In like manner he should be led on to feel the nobility of generosity and self-sacrifice by witnessing the delight which it brings his moral teacher. It is only where morality becomes infused with life and warmth by the feelings, the moral repugnances and enthusiasms, of the instructor, that it takes a deep root in the child's nature. It is the moral personality and character which make the training of one parent and one teacher so much more powerful a moulding influence than that of another.

The training of the moral faculty in a self-reliant mode of feeling and judging includes the habitual exercise of the sympathetic feelings together with the powers of judgment. And here much may be done by directing the child's attention to the effects of his conduct. The consequences of wrongdoing and the beneficent results of rightdoing ought to be made clear to the child, and his feelings enlisted against the one and on the side of the other. Not only so, his mind should be exercised in comparing actions, in detecting similar moral characteristics in a variety of actions, and in distinguishing betweeen like actions under different circumstances, so that he may become ready and apt in pronouncing moral judgment.

What is called moral instruction should in the first stages of education consist largely of presenting to the child's mind examples of duty and virtue with a view to call forth his moral feelings and to exercise his moral judgment. His own little sphere of observation should be supplemented by the page of history and of fiction. In this way a wider variety of moral action is exhibited, and the level of everyday experience is transcended. Such instruction is moral education in the full sense, since it attracts (or repels) the feelings as well as enlightens the judgment. On the other hand, the mere teaching of the parts of the moral law, the code of duties, the classification of virtues, and so on, while giving knowledge, and to some extent aiding the intellectual side of the moral faculty, does not call the feelings into exercise.

It follows from the above account or the way in which the moral faculty grows that in order to a full and complete development the influence of the parent and teacher must be aided by other influences. The companionship of other children is an important condition of a healthy growth of the moral feelings. The sense of justice grows up in connection with the interplay of a number of individual interests and claims. A single child brought up alone is commonly wanting in this feeling. The free region of activity, the nursery and playground, have a moralising effect by accustoming each child to consider himself as one of a number, to see the reciprocity of good conduct (honesty, kindness, &c.), and to limit his expectations in deference to others' claims.

Not only so, this daily contact with a number of children is morally important as familiarising the child with the non-personal character of the moral law. In the home he finds the germ of a public opinion in the common sentiment of the family. But it is in the school that this new agent exercises its full power. Where there is a healthy moral tone in a school, a contempt for cowardice, meanness, cruelty, and an admiration for pluck, fidelity, generosity, it is a most valuable agency in fashioning the growing moral sentiment of the individual. It is in this wider experience that the boy comes to recognise that the distinctions of right and wrong are not the impositions of an individual, however good and wise, but are imposed and enforced by the common will; that the moral law is a universal law sustained by the collective voice of mankind. And it is by this ampler experience of membership of a society that he comes to realise fully his own part in representing and enforcing the moral law.

It follows from this that the guidance and illumination of this common sentiment and public opinion is one of the main functions of the moral educator. Custom has an enormous force in determining our moral standard. Even adults are wont to think the fact that society allows a thing a sufficient proof of its intrinsic rightness. And in early life we are strongly inclined to steer our individual judgment by the compass of the sentiment of the body to which we belong. If then a child falls into a community where unhealthy moral feelings exist, his moral development will be hindered. The head of a school must be careful to see that the force which is so valuable an aid to moral growth when it acts in the right direction is not working in the opposite direction, perverting the moral faculty.

APPENDIX.

On the nature of Sympathy, consult Bain, *The Emotions and the Will*, Pt. I., Ch. VI. ; Herbert Spencer, *Principles of Psychology*, Vol. II., Part VIII., Chap. V. ; Volkmann, *Lehrbuch der Psychologie*, II., § 136 ; Horwicz, *Psychologische Analysen*, 2er Theil, 2e Hälfte, Sect. 12. On the cultivation of Sympathy in the young, see Miss Edgeworth, *Essays on Practical Education*, Chap. X. ; and Mdme. Necker, *L'Education*, Livre V., Chap. IV.

On the nature of the Intellectual Feelings, see Bain, *The Emotions and the Will*, Pt. I., Chap. XII. ; Nahlowsky, *Das Gefühlsleben*, 2 Buch, 2 Absch., § 16 ; and especially Horwicz, *Psychologische Analysen*, 2er Theil, 2e Hälfte, Sect. 8. On the awaking of a pleasurable interest in knowledge, see Bain, *Education as Science*, Chap. VI., p. 177, &c.

On the nature of the Æsthetic Sentiment, see Bain, *The Emotions and the Will*, Chap. XIV. ; Spencer, *Principles of Psychology*, Vol. II., Pt. VIII., Ch. IX. ; Nahlowsky, *Das Gefühlsleben*, § 17, *seq.* ; and Volkmann, *Lehrbuch der P.*, § 133. On the cultivation of Taste, read Mdme. Necker, *L'Education*, Livre V., Ch. III. ; Miss Edgeworth, *Practical Education*, Ch. XXII. ; Bain, *Education as Science*, Chap. XIII. ; Th. Waitz, *Allgem. Pædagogik*, 2er Theil, 2es Absch., § 19.

On the nature and growth of the Moral Sentiment, see Bain, *The Emotions and the Will*, I., Chap. XV. ; H. Spencer, *Principles of Psychology*, Vol. II., Part VIII., Chaps. VII. and VIII. ; Waitz, *Lehrbuch der Psychologie*, § 39. The relation of the ethical sentiment to the social feelings is well brought out by Horwicz, *Psychol. Analysen*, 2er Theil, 2e Hälfte, 2es Buch. The early stages of moral development are dealt with by Pfisterer, *Pædagog. Psychologie*, Kap. 2, § 16, 18. On the training of the moral faculty by discipline, &c., see Mdme. Necker, *L'Education*, Livre III., Chap. VI. ; H. Spencer, *Education*, Chap. III. ; Bain, *Education as Science*, Ch. III., p. 100, &c., *cf.* Ch. XII. ; Beneke, *Erziehungs und Unterrichts-lehre*, I., 2es Kap., Abschnitt, 2 and 4 ; Th. Waitz, *Allgem. Pædagogik*, 2er Theil, 2er Absch., § 14.

CHAPTER XIII.

THE WILL: VOLUNTARY MOVEMENT.

We may now pass on to the consideration of the development of the third side or phase of mind, namely the Active side or Willing.

Phenomena included under Will. The term Will is used in Mental Science to include all active operations of mind. By active operations are meant not only external actions or movements, but also internal acts of mental concentration, together with certain preliminary stages of action, as desiring a thing, reflecting or deliberating about an action, and resolving to do a thing.

Of these phenomena completed external actions are the most important. What we commonly mean by a manifestation of will is some outward action or movement. Will is thus seen to stand in close relation to the motor side of the nervous system. As we popularly phrase it, the active organs (limbs, voice, &c.) are the instruments of the will.

Actions or movements, though in a wide sense belonging to the region of will, are not all commonly called voluntary. We distinguish between voluntary and involuntary, or better, non-voluntary movements.

Warding off a blow with the hand is voluntary, blinking when an object is suddenly brought near the eye is non-voluntary. Some of these non-voluntary actions, as we shall see presently, are scarcely *mental* operations at all, since consciousness enters very faintly into them. Others, again, though having a distinct mental accompaniment are not consciously directed to any end. Voluntary actions in the full and complete sense may thus be marked off as actions accompanied by consciousness, and characterised by the presence of a purpose or end. Briefly they may be described as actions consciously directed towards some end.

Relation of Willing to Knowing and Feeling. By means of this rough definition of the phenomena included under the term Willing we shall be able to assign its relation to knowing and feeling. Here again we have to note an opposition and a connection. The outgoings of the mind in action, involving the excitation or 'innervation' of the motor nerves and muscles, are incompatible with the comparatively passive state of observing something or thinking about something, with its physical accompaniment of bodily stillness. The man of energetic action is popularly contrasted with the man of reflection. Similarly strong emotional excitement and action are incompatible, and the man of strong will is one who among other things brings emotion under control.

At the same time, voluntary action always includes an element of knowing and of feeling. The motive to voluntary action, the end or thing desired, is the gratification of some feeling (*e.g.*, ambition, or the love of applause). And we cannot act for a purpose without knowing something about the relation between the action we are performing and the result we are aiming at. Thus it is feeling which ultimately supplies the stimulus or force to volition, and intellect which guides or illumines it.

Nature of Willing. A voluntary action has been defined as an action consciously directed to some end. We have now to examine a little more closely what is involved in such an action. Let us take an example out of child life. A boy sees a flower growing on the wall above his head. He raises his body and stretches out his hand to pluck it. This is a voluntary act. What happens here? The sight of the flower calls up to his mind a representation of the pleasure of smelling it or carrying it in his buttonhole. This at once excites a desire for or impulse towards the object. The desire again suggests the appropriate action which is recognised as the means which will lead to the desired end. In other words there is the *belief* (more or less distinctly present) that the action is fitted to secure the result desired.

Take another case. A girl playing in the garden suddenly feels heavy drops of rain and hears the murmurs of thunder. She runs into the bower. Here the action is similar, only that it is due rather to an impulse away from a disagreeable experience than to an impulse towards an agreeable one. We say that the force at work here is not a *desire* for something pleasurable, but an *aversion* to something painful.

These simple examples may suffice to show that the fundamental element in willing is desire, either in its positive form, as desire for what is agreeable, pleasurable, or in its negative form, what we best mark off as aversion. The inclination, or tendency of the active mind towards what is pleasurable and away from what is painful, is the essential fact in willing. Experience teaches the child what is pleasurable or painful, and what kind of actions are fitted to realise the one and avoid the other. But the impulse to seek pleasure and to avoid pain is primordial and instinctive.

Analysis of Desire. It follows from this brief inspection of the process of willing that in order to understand its nature we must first understand that of desire. The state of desire is the more elementary phenomenon which underlies and precedes volition.

(1) Representative Element. In analysing the mental state known as desire we find as the most conspicuous element a representation. When we desire a material possession, a person's good opinion, or a particular occupation, we are it is plain representing something which is said to be the object of desire. Since it involves a representation desire is related to the intellectual side of mind. Where there is no knowledge there can be no desire. We must have had experiences and be able to recall these before we can have a desire for new and similar ones. In desiring a cool plunge on a hot day a boy is recalling a past experience. Hence our desires multiply with our experience and knowledge.

The representation involved in desire may be either an image of memory (reproduced or primary image) or one of constructive imagination (constructed or secondary image). We desire things of which we have had no actual experience, provided that we are able to build up the necessary images. Hence desire accompanies not only the recallings of past personal experience but the imagination of untried experiences, as in listening to others' recitals, in reading, in weaving images of possible experiences in the future. Finally, desire may attach itself to abstract ideas or concepts. The desire for truth, or for virtue, illustrates this mode of desire.

(2) **Element of Feeling.** A closer inspection of the state of desire shows us that all representations do not excite desire. Many images and concepts arise in the mind without any appreciable accompaniment of desire. The mental agitation of desire is only aroused by the representation of concrete objects (or qualities of things) as pleasurable or pleasure-bringing. In desiring a succulent fruit a child represents the delight of eating it: in desiring a good social position or a high reputation a man represents the situation or circumstances on their pleasurable side.

Now the representation of something pleasurable itself contains an ingredient of pleasurable feeling. In representing a beautiful landscape, or a graceful melody, the mind has an ideal 'sip' of the actual pleasure. But in ordinary cases this ideal element is greatly inferior to the reality, and is recognised as inferior. And it is with this consciousness of inferiority that the state of desire is immediately connected. Desire implies a sense or consciousness of want, deficiency, of the absence of something; and this arises in connection with the representation of something agreeable or pleasure-bringing in so far as there is a recognition of its non-realisation at the moment. When, on the other hand, this sense of discrepancy between the present and the absent state, representation and presentation, the ideal and the actual, disappears, desire expires. In intense expectation, in the vivid imagination of unattainable delights, as in reading a work of fiction, and in absorbing moral and religious aspiration approaching to ecstasy, desire succumbs, giving place to a momentary sense of fruition or realisation.

It seems paradoxical at first to speak of the representation of a pleasure which is aware of its own shortcoming. It might appear as if we must realise our object in the measure of completeness in which we represent it. But this sense of non-realisation in desire is by no means a solitary mental phenomenon. In memory, for example, we are aware of the inferiority of the present representation to the past presentation. In other words, the mental image is attended by a peculiar mental state or feeling, namely, the assurance that there *was* something more, unrealised at the moment. It is not improbable that in representing a class of objects by means of a concept or generic image there is a similar mental concomitant. The mind is aware of an indefinite range of objects not directly represented or distinctly imaged, but only vicariously represented, or re-represented.[1]

Relation of Desire to Feeling. It is to be noted that the relation between feeling and desire is a particularly close one. We mark off a pure feeling as a passive phenomenon. There is no ingredient of activity in an enjoyment, say that of a delicate flavour,

[1] See, on the whole subject of such vague accompaniments of our more distinct mental states, an interesting article, by Prof. W. James in *Mind*, Jan., 1884, 'On some omissions of Introspective Psychology'.

considered as a mental state apart. At the same time, as we saw above, all feeling vents itself in movement, and to this extent has an active accompaniment. And further, every feeling, whether in the actual or ideal form, tends to excite desire. Not only does the representation of a pleasure arouse desire, the actual experience of one commonly leads on to a desire for its prolongation, and possibly its increase in intensity. Similarly, actual pain, as well as the mere representation of it, is a common antecedent of the other active state, aversion.

The excitation of desire in connection with an actual pleasure is probably a similar process to that involved in its excitation by a representation of pleasure. Actual enjoyment so far as complete, that is considered simply in itself, is not desire-provoking but satisfying or quieting.[1] In so far as we enjoy a thing at the moment we cease to desire. But no enjoyment remains long at one level of intensity. As we saw above, the prolongation of any pleasurable stimulation tends to diminish its effect. And it is probably the sense of a falling-off which is the real excitant of the ever-renewed desire which we commonly find in these circumstances.

While feeling is thus an antecedent and main condition of desire, desire in its turn contributes new elements of feeling. As pointed out above, one great class of pains are those of want or craving. The essential ingredient of desire, the sense of the inferiority of the actual to the ideal, of what is actually present to what is represented, is distinctly painful, and when desire is fully developed, that is to say, is not immediately replaced by its satisfaction, the painful ingredient becomes intense. We thus see

[1] Mr. Stephen expresses this by saying that pleasure is a state of equilibrium, or a state in which there is a tendency to persist, *Science of Ethics*, Chap. II., § 12.

that the whole state of desire is a mixed state in which a pleasurable element (the accompaniment of the representation) is continually opposed and counteracted by a painful (the sense of deficiency, shortcoming).[1]

(3) **Element of Activity.** Desire is essentially an active phenomenon. It is this characteristic which differences it at once from knowing and from mere feeling. It is in virtue of this characteristic that it constitutes the connecting point between knowing and feeling on the one side and willing on the other. In desiring the mind is in a state of active tension, or active tending towards the realisation of the feeling only represented at the moment. This innermost core of desire has been variously described as a movement of the mind (*e.g.*, by Aristotle) and more commonly as a striving towards the fruition or realisation of the object.[2]

This element of active prompting in desire takes two directions. (*a*) In the first place, it assumes the form of *mental* activity, that is a concentration of the attention on the representation. In desiring a pleasure strongly the mind is as we commonly say "full of the idea". The representation tends to persist and to monopolise the attention.

This direction of the attention tends to the fuller development and intensification of the representation. Hence it involves a conscious or

[1] The relation of desire to feeling is carefully discussed by Volkmann, *Lehrbuch der Psychologie*, Vol. II., § 143.

[2] This state of activity only becomes what we ordinarily call striving when the object of desire is withheld for a time, so that desire is fully developed. Hence, perhaps, it is better to use the expression 'tendency to strive'.

unconscious striving towards a fuller realisation. The exact nature of this striving is a matter of uncertainty. Volkmann connects it with the fundamental property of the 'Vorstellung' namely its tendency to assert itself over against all limitation or hindrance (*op. cit.*, § 139).

(*b*) In the second place, desire is naturally related to *bodily* or muscular activity. All feeling as we saw involves as its effect some excitation of the motor organs. In the state of desire this motor element becomes still more prominent. This is plain enough in cases where experience has taught the mind that a certain mode of muscular action leads to the realisation of desire. But the relation is probably a primordial one. Antecedently to the teachings of experience we see desire prompting to some degree and range of motor activity. It is this branch of the activity of desire which is commonly marked off as impulse (Trieb).

The tendency to muscular action in desire seems to involve, in addition to the process of innervation accompanying the act of attention, a wider sub-excitation of motor tracts. And it is the psychical concomitants of these motor processes, namely, sensations of innervation, aided by those of muscular contraction, which probably give the character to the whole state of desire as one of restlessness and readiness to act.

The term impulse (Trieb) is commonly confined to those innate promptings of activity in which there is no clear representation of a pleasure, and consequently no distinct desire. Here the active element is greatly in excess of the intellectual. But in all desire there is a stirring of motor activity, and so an ingredient of active impulse.[1]

In the foregoing analysis of desire the common view has been adopted that desire is related to the representation of what is pleasure-bringing. This seems to be clearly the case in many instances, as in desiring sensuous gratifications, the pleasures of social entertainment, art, &c. In other cases, as in desiring knowledge, and more particularly virtue, the pleasurable ingredient is less conspicuous. We seem to desire moral goodness without representing the possession of it as

[1] On the relation of impulse to desire, see Volkmann *op. cit.*, §§ 141, 142: Wundt, *op. cit.*, Cap. XVIII., § 1.

pleasurable. Or, at least, the pleasure represented is quite disproportionate to the strength of the desire. These apparent exceptions are probably to be accounted for by such considerations as these: (1) Since pleasure is the immediate accompaniment of certain presentations (sensations and perceptions) we cannot represent it except by recalling these and fixing our attention on the representations. Hence in desire the image of the objects or circumstances directly contributing the pleasure tends to become most prominent in consciousness. (2) In all dependent desires, *i.e.*, desires for the more remote conditions of pleasure, and for means to ends, the representation of the pleasure falls back still more into indistinct consciousness. And as we shall see by and by, the very nature of voluntary action necessitates the concentration of the mind on its immediate results, though these are only means to the object really desired. (3) As will be shown presently, we may go on desiring things under the force of habit when we no longer represent them as pleasurable with the same distinctness as at first. (4) Lastly, as will be shown also, the force of what seems a positive desire for an object is in many cases derived from a negative desire or aversion to some correlative pain. [1]

A point of some interest concerning the intellectual side of desire is its relation to belief. Is desire accompanied by a belief in the attainability of the object desired? In most cases, this element is not present in a clear conscious form. We desire many things, *e.g.*, those of which others tell us, without entertaining the question of their possibility. It is to be remarked, too, that the confident expectation of a good is apt to weaken desire. The assurance of a coming realisation is taken as a present equivalent for the reality. On the other hand, desire as a tendency or striving towards fulfilment, contains the germ of

[1] On the question as to whether pleasure is the object of desire, see Dr. Bain, *The Emotions and the Will*, Part I., Chap. VIII., Sect. 7; Prof. H. Sidgwick, *Methods of Ethics*, Chap. IV.; Mr. L. Stephen, *Science of Ethics*, Chap. II., § 11, and following. German psychologists are no less divided than English moralists as to the real object of desire. Waitz maintains that it is pleasure (*Lehrbuch der Psychologie*, § 40). On the other hand, Volkmann argues against the old psychological dictum, "nihil appetimus, nisi sub specie boni". He holds that what is desired is not the object considered in itself as a good or as pleasure-bringing, but simply the representation in its full measure of intensity; that in desiring there is no reference to the pleasure actually attending its satisfaction; that in cases "where we recognise an object to be a good and desire it, we do so not because it presents itself to us as a good in itself apart from the desire, but because, being in the act of desiring brought into relation to the pain, it makes itself known as the dissolution of this pain," *op. cit.*, §§ 139-143. The author adds a valuable historical résumé of opinions as to the nature of desire (p. 389).

confidence. A clear consciousness of the unattainableness of a good is fatal to desire.

Desire and Aversion. The great contrast in the region of feeling between pleasure and pain has its counterpart in the domain of activity. While the representation of what is pleasurable excites the positive form of desire, the representation of what is painful awakens the negative form of aversion. We incline or strive towards what gives us pleasure, and away from what gives us pain. If the pain be actual, aversion takes the form of craving for relief, if it be simply imagined it assumes the form of a mental recoil or shrinking back.

It will be noted that while desire has always to do with the absent and the non-realised, aversion may have to do with the actual and present. In suffering pain the mind longs for a doing away with the actual, or a change from the present.[1] While the object of desire is something positive, pleasure, that of aversion is something negative, absence of pain. Hence though both prompt to action their mode of prompting is different. Pain though a powerful stimulus to the will has a limited range. The object of aversion is realised at a definite point, namely when the pain ceases. But the object of desire is in a sense never fully realised, since however great the pleasure the mind can still desire an increase or at least a prolongation of it. This distinction has, as we shall see, an important bearing on the education of the will. It is to be added that while desire and aversion are thus contrasted, they are very closely connected one with another. The pleasure of an agreeable flavour is opposed to or incompatible with the pain of a disagreeable one, the pleasure of harmony, with the pain of discord, &c. Hence in desiring the positive enjoyment the mind tends to pass on more or less fully to the complementary state of aversion. The connection between the two states is particularly close in all cases where the pleasure desired, or the pain feared, is relative to, or dependent on, the opposite

[1] Even in shrinking from a future pain we seem first to represent it as an actual present state, and then to crave for its removal. This would give a meaning to the assertion of Waitz, that aversion involves a belief in the reality of the pain, whereas desire involves no belief in the reality of the pleasure, *Lehrbuch der Psychologie*, § 42, p. 443.

state of feeling. Thus in dreading the pain of a loss of some good, as a friend or wealth, we are more or less distinctly desiring a continuation of the good. On the other hand, in desiring liberty, health, or knowledge, we are more or less distinctly shrinking from the pain of restraint, of sickness, or of ignorance. The force of the desire for moral objects, the approval of others or self-approval, is to a large extent derived from a shrinking from the pains of condemnation and self-reproach.

Finally, it may be observed that since all desire when fully developed involves a painful element, every craving for a positive good or happiness tends when prolonged to be accompanied by an aversion to pain. When any good is slow in coming, the desire for it is apt to assume the form of a longing to escape from the pangs of desire. Such shrinking, however, is a later and secondary form of desire. In its initial form it is desire for something represented as pleasure-bringing.[1]

On what Strength of Desire and Active Impulse depends. Desire, and along with it, active impulse, admits of different degrees of strength or energy. Our desires range through all degrees of intensity and persistence, from vague fugitive wishes, up to intense and absorbing longings. These differences show themselves in different ways. A strong desire prompts to great and prolonged activity or exertion, whereas a weak desire fails to do so. Again, strength of desire may be measured by the amount of pain incurred if the desire is unsatisfied.

The most important circumstance determining the strength of desire or active prompting is the magnitude of the pleasure represented. In general it may be said that the greater the pleasure represented the stronger will be the desire, and the more energetic the outward stream of active impulse. Thus a school-

[1] This seems to be the ingredient of truth in the doctrine derived from Plato, and adopted by modern Pessimists, that all desire is at bottom aversion, that is a striving away from a present pain. This doctrine of will is naturally allied to the theory of feeling which regards all pleasure as negative, consisting merely in the cessation of pain. See my work on *Pessimism*, Chap. IX.

boy's activity (mental and bodily) is roused to a much greater extent by the prospect of a whole holiday than by that of going home half-an-hour earlier than usual. Speaking roughly we may say that the strength of desire varies with the intensity of the pleasure desired. But we must be careful to note that the image may not accurately represent the degree of the actual enjoyment. The prospect of a prize in the remote future may excite little desire because the child is 'weak in futurity' and cannot picture distinctly and steadily the far-off delight. That which is near influences us, by way both of attraction and repulsion, more powerfully than that which is remote. It follows that the real determining force in desire is the magnitude of the pleasure as represented.

It follows from what was said above that by adequate representation here is not meant a vividness of representation approximating to realisation. We may represent a pleasure, say that of a visit to a new country, as great without realising its full intensity. Combining what has just been said with what was said before, we see that a strong desire involves first the *relative* magnitude of the represented pleasure, *i.e.*, a sense of the great superiority of the reality to the representation, and secondly the *absolute* magnitude, *i.e.*, a sense of the greatness of the actual pleasure in itself, or in relation to other actual pleasures.

This general principle must however be qualified by one or two considerations. In the first place, the mind is not at all times equally disposed to activity. A more powerful inducement is needed to stir active impulse when we are inactive and indolent than when we are strongly inclined to activity. This varying mental condition seems to depend on the varying supply of active energy in the motor organs, central and peripheral. A plentiful supply of such energy may so dispose a healthy child to do things, to put forth exertion, that the slightest suggestion of a resulting pleasure or end suffices to awaken desire and stir the currents of activity.

This disposition to muscular action seems to be specially connected with a well-recruited and consequently 'unstable' or excitable condition of the motor centres. Mere vigour of muscle does not imply this readiness. Such a state is an antecedent condition of a wide range of pleasurable activity: the more vigorous the motor organs and the more ready for work, the higher can the exercises be carried without becoming excessive and painful. The opposite state of active lethargy or indolence, on the other hand, corresponds with a restricted range of pleasurable activity, or in other words, a wide range of excessive and effort-attended action. Hence, as we shall see by and by, the inclination to activity is commonly attended by a more or less distinct representation of the pleasure of the activity itself, as distinguished from that which constitutes the object of the primary desire. Similarly, indolence commonly implies a shrinking from a represented pain; that of excessive or effort-attended action. It may be added that though this readiness to act would directly strengthen merely the active outcome of the desire, it tends indirectly to strengthen the desire as a whole. The mind of a vigorous child, strongly disposed to act somehow, will through the co-operation of this force be more energetic and persistent in entertaining objects of desire. Finally it is to be noted that the principle applies not only to bodily activity but to mental. A vigorous condition of the brain involving an alertness of the attention is favourable to any direction of the mind to what is agreeable.

Finally, active impulse comes under the dominion of the principle of habit. When the mind has frequently and habitually erected certain representations into objects of desire, and striven towards their realisation there is generated a tendency to go on desiring and striving in these directions. In this way habitual desires or fixed inclinations are formed.

This effect of custom or habit in fixing desire in definite directions shows itself most distinctly in the continued striving with unabated energy towards objects which are no longer pleasure-bringing, in their original degree, and even objects which cease to be so altogether. The confirmed student may pursue study with undiminished energy long after he has outlived the early intense delight of gaining knowledge. The case of the habitual drunkard desiring what he knows is harmful and productive of pain, is a familiar example of this principle.

Here, again, it may be said that it is merely the active outcome of the desire, in other words, the external action originally prompted by it, which is fixed and strengthened by habit. If we cease to find pleasure in a thing we can no longer go on desiring it. But this idea does not accord with the facts. When customary objects of desire are withholden, we see all the manifestations of intense craving. The intensity of desire in this instance is not to be accounted for by the presence of the old pleasurable representation alluring and deceiving the mind, though this is often a factor in the maintenance of desires (*e.g.*, those of the old sportsman, and of all who have outlived a certain mode of enjoyment which they can still in a measure picture). The full explanation is that as we saw above (p. 469) habit or use directly intensifies the pain of craving. The customary pursuit of any object tends to render that object necessary to us, so that its absence seems like the removal of a part of ourselves. Hence in all habitual desires the striving tends to take on more and more the negative form of an aversion, or striving away from a present pain. It may be added that what we call innate impulse or instinct illustrates the same relation between the positive and negative aspects of desire. The 'blind impulse' of the migratory bird seems to contain no distinct representation of and desire for a positive pleasure, but merely a striving away from its own misery, or towards its own appeasement.

Individual Differences of Will: Active Temperament. By help of the above considerations we may roughly define the more general conditions on which individual differences in respect of activity or what may be called will-material depend. A specially strong will-capability involves in the first place keenness of desire. Since desire stands in the closest relation to feeling, keenness of desire clearly carries with it vividness or intensity of feeling. Strong emotional susceptibilities are thus an antecedent condition of vigorous activity. But feeling in itself is not enough. Many children have strong feelings but no corresponding degree of will-capability. What is needed over and above this is a powerful disposition to act, or what we specially mark off as the active temperament. The natural basis of an energetic will is a good supply of feeling organically connected with strong active impulse. The conditions of the higher manifestations of activity in calm rational volition will appear later on.

The close connection between intensity of feeling and strength of will is strikingly illustrated in pathological conditions. Patients affected by enfeeblement of will-power or an inability to carry out the purposes they form are characterised by diminution or loss of sensibility. As M. Ribot observes, "the real cause of these enfeeblements is a relative insensibility, a general weakening of sensibility: that which is impaired is the life of feeling, the possibility of being moved" (*Les Maladies de la Volonté*, p. 53).

Desire and Volition. Thus far we have been concerned with the root-principle or underlying force of willing. We have now to study it in its full manifestation of volition, or voluntary action. The mere desire for a thing and the tendency to strive towards it, though presupposed in volition, do not constitute it. We frequently desire things and are conscious of the incipient outgoings of activity, and yet do not reach the stage of voluntary action. In order to the full development of an act of will another factor is needed.

This new factor involves the representation, not only of some object of desire, but also of some action which we recognise as leading to the realisation of this object. It is only when the rise of a desire for an object is accompanied by a representation of an appropriate action that we are in a position to will a thing and to perform an act of will. Here, again, it is obvious that the necessary factor has to be supplied by experience and association. When, to take a simple example, the desire for warmth prompts the action of going to the fire, it is because this particular action has in our experience become connected with the object desired.

The process involved in the simplest type of voluntary action may be described as follows. The initial stage is the rise of some desire in the mind. This desire is accompanied by the representation of some movement (motor representation) which is recognised as subserving the realisation of the object. The recognition of the causal relation of the action to the result involves a germ of belief in the attainability of the object of desire, or in the efficacy of the action. Finally we have the carrying out of the action thus represented. This may be described as the direction of the active impulse involved in the state of desire into the definite channel of action suggested. This last stage of the process of volition is known as the *act*. The desire which precedes and determines this is called its moving force, stimulus or *motive*. Since this motive involves the anticipation of the final realisation, this consummation is spoken of as the object, purpose, or *end* of the action and correlatively, the action as the *means* of gaining or realising the object of desire.

It is plain that we have here to do with a double order, that of actual presentation and of representation. In actually carrying out an action the pleasure follows the action. It is the 'end' in the sense of the product or result of the action. But in representing it the order is reversed. The representation of the end, or the resulting pleasure, precedes the representation and performance of the action. Thus while the action is the cause of the (actual) pleasure, the anticipation of the pleasure is the cause of the action. Hence the tendency to use 'motive' and 'end' as synonymous terms.[1]

The end of the action corresponds strictly to the object of the desire, that is, the pleasure (or cessation of pain) represented. But as the representation of the pleasure is necessarily bound up with that of the situation or circumstances of which it is an accompaniment, we tend to include this last in 'end' and still more perhaps in 'purpose'. Primarily, at least, we only desire and aim at the pleasure. But in recognising the action as leading to the pleasure we may be said to desire this in a subordinate degree. From this borrowed or reflected desire for an action we must carefully distinguish the desire for it considered as intrinsically pleasurable. As we shall see by and by, this frequently combines with the desire for its pleasurable result.[2]

The exact relation of the mental process here described to the actual carrying out of the action has given rise to discussion. Some would say that a further link in the chain of psychical events is here required namely, a volition proper, or a determination to carry out the represented action. But this ingredient appears to belong to more complex processes of volition than that now considered. The probable explanation of the sequence of the psychical and physical event is as follows. Every motor representation appears to involve a nascent excitation of the motor centres engaged in the actual process of innervating the muscles, and may indeed be described, physically as well as psychically, as a rudimentary stage of the movement. This is borne out by such

[1] A fuller analysis would show that in representing the action we represent it as preceding or leading up to the fruition. To this extent then the representation of means precedes that of ends.

[2] Volkmann says that in a voluntary action the desire of the end is the cause of the desire of the means *op. cit.*, § 147. Psychologically, as well as ethically, it is important to distinguish between the emotive and desire-prompting element in the complex volitional representation, and the merely intellectual element, representation of the action itself and other collateral results not desired. This answers to the ethical distinction between 'motive' and 'intention'.

facts as the tendency to move the limbs *involuntarily* when a movement is vividly suggested (as in watching another person move). But movement excited by desire involves more than this. Desire itself includes a state of active tension or sub-excitation of the motor centres, and so a tendency to muscular action. When, then, in a state of desire a particular movement is suggested this force discharges itself along the particular line thus opened up.[1]

Willing and Attending. It is customary to distinguish between two branches of will the External, muscular action or movement, and the Internal, mental action, voluntary attention or concentration. These two phases are rightly distinguished. They answer roughly to two directions of will-development, illustrated in the man of thought and the man of action.

At the same time the two modes of activity are not wholly independent one of another. On the one side, attention involves, as we saw above, a certain amount of motor innervation and muscular activity. On the other side, all voluntary movement involves attention. In doing a thing in order to realise some end the mind is fixed on the object desired and aimed at, and in a subordinate measure, on the action subserving this. In the more complex processes of willing (deliberating, choosing, &c.), attention will be found to play a still more conspicuous part.[2]

[1] The relation of desire to volition is well given by Waitz, *op. cit.*, § 41, *cf.*, Volkmann, *op. cit.*, § 147. Dr. Bain looks on desire as more complex than, and as secondary to, volition. There is the "solicitation of the motive" or the "prompting" without the ability to act on it. (*The Emotions and the Will*, Part II., Chap. VIII.) As pointed out above, a fully developed desire or state of craving involves as its negative condition the absence of a representation of an appropriate action. It is as Dr. Bain observes a state of conflict. But the essential principle of desire is present in all voluntary action. Dr. Bain's language implies, indeed, that every process of stimulating or motiving the will involves desire.

[2] This applies to all actions performed with full consciousness. As we shall see by and by, repetition and habit tend to diminish the amount of at-

Development of Willing. Having thus roughly analysed the process of willing, we proceed to trace its development. Here we shall be concerned first of all with the manifestation of will in external action. Its other manifestation in voluntary concentration, which has already been discussed to some extent in its bearing on intellect, will be reconsidered later on.

The growth of Willing, like that of Knowing and Feeling, is from the simple to the complex, and from the presentative to the representative. The actions of a young child, *e.g.*, carrying something to his mouth, are comparatively simple movements directed to immediate enjoyments. The actions of an adult, *e.g.*, writing a letter, preparing for an examination and so forth, are complex chains of movements, and involve an increase of representative power or power of picturing *remote* ends.

Again, action is at first presentative in the sense that it is *peripherally* initiated, being a response to present sense-impressions (*e.g.*, the sight of food). Later on it becomes representative in that it is *centrally* initiated, being called forth by internal processes of imagination and not directly by sense-impressions.

A series of gradations of voluntary movement may be distinguished corresponding to the grades of Intellection, namely, Sensation, Perception, Representative Imagination, and Thought. G. H. Schneider correlating different grades of active impulse with different grades of feeling divides the former into Sensational, Perceptional, Ideational, and Rational (*Der thierische Wille*, *cf.*, *Mind*, Vol. V., 1880, p 426).

tention involved; but in so doing they detract from the full voluntary character of the actions. For a fuller account of the relation of these two modes of activity, see Wundt, *Physiol. Psychologie*, Vol. II., Cap. XX., Sect. 1.

Once more, the higher stages of action show a marked increase in respect of complexity and representativeness in that the psychical process preceding the overt action becomes more complicated. Instead of a rapid process, the representation of an end and the appropriate action, we have intricate processes of representation known as deliberation, choice, and resolution. Finally, the higher developments of action embrace modes of willing which are altogether internal. These are the actions which make up the control of movement, feeling, and thought.

The growth of the Will, like that of Intellect and Emotion, implies the presence of certain instinctive capabilities and dispositions. These have already been touched on and will have to be considered more closely presently. In addition to these we must reckon the effect of exercise, experience, &c. The Will grows by exercise. Each form of its activity becomes more perfect by practice. And the lower forms of exercise in bodily movement prepare the way to some extent at least for the higher exercises. As will be seen more fully presently, the whole process of growth illustrates the effects of experience and association. The primitive impulses of will have to be guided into definite channels, fixed in certain directions, and this is the work of experience.

In the present chapter we shall be concerned with the first stage of will-development, that of presentative action or bodily movement. We have to enquire by what steps the child comes to command his muscles and his bodily organs and to make them the instruments of his desires and purposes.

How Voluntary Movement Arises. As we have seen, voluntary movement includes a definite representation of a particular object or end, and of an action fitted to attain the object. And it is plain that the knowledge of this particular end, and also of the means of realising it, must have been gained from experience. And this seems to imply that the movement must first have been performed without any clear representation either of the movement itself or of its result. What we have to do then is to observe closely the early forms of movement in order to see how action wanting this definiteness of prevision passes into voluntary action proper, that is to say action accompanied by such a definite prevision. In order to this we must begin by distinguishing the several classes of early movement.

Early Movements Classed. (1) *Unprompted or Random Movements.*—Of the early movements which precede voluntary ones the first class is that known as spontaneous, unprompted or random movements.[1] These include all movements which result from the excitation of motor centres. They are not preceded by any conscious element, feeling or desire, and have no psychical accompaniment at all beyond the muscular experience attending the carrying out of the movement. They appear as altogether wanting in purpose, and so are called 'random' movements. They are described as the spontaneous overflow of energy locked up in the central motor organs, as the result of the disposition of a healthy and vigorous

[1] They have also been called 'automatic movements' (Wundt) and impulsive movements (Preyer)

motor organ to fall into a state of activity. Many of the spasmodic and irregular movements of young animals and children soon after birth belong to this class. Such are movements of the arms, legs, eyes, &c., which appear to be due to no impression received from without and no internal feeling.

(2) *Reflex Movements.*—These differ from the first class in being the result of a process of sensory stimulation. They are responses to external stimuli, and as such involve a double current of excitation, an inward through the sensory nerves, and an outward through the motor nerves. They agree, however, with random movements in the circumstance that they involve no distinct psychical antecedent. The impression resulting from the incoming nerve-process is fugitive, evanescent, and 'sub-conscious,' the incoming excitation being instantly followed by the outgoing excitation and the movement. The movement is restricted in character and is connected by direct nervous paths with the sensory organ concerned. Reflex movements have slightly more of the appearance of a purposive character than automatic movements, though this is in many cases very vague and ill-defined. And there is no element of conscious desire present. Such are the actions of closing the fingers on an object put in the infant's hand, blinking when an object is suddenly brought near the eye. Some of these as breathing, swallowing, are necessary for the child's existence, and are (approximately) perfect from birth. Others as blinking appear somewhat later.[1] As we shall see presently,

[1] See Preyer, *Die Seele des Kindes*, p. 20, *cf.*, Cap X.

voluntary actions often repeated and become habitual tend to approximate to this reflex type.

The exact nature and range of reflex action or reflexes is a point which has given rise to much discussion. Many actions commonly described as reflex, that is non-volitional, responses to stimuli are preceded by a conscious sensory impression, *e.g.*, closing the eyes at a dazzling light, starting at a loud sound. These are marked off by some (*e.g.*, Dr. Carpenter) as sensory-motor reflexes. These involve the activity of the centres of consciousness. On the other hand, there are many reflexes involving only the lower centres in which there is no antecedent sensation, *e.g.*, the movement of the limbs, in response to stimuli, of a sleeping child or of a decapitated animal. These have been marked off as excito-motor actions.[1]

(3) *Instinctive Movements.*—It is not easy to distinguish these from reflex movements. Like these last they are responses to stimuli. But they are marked off from reflex movements first of all by being more complex in character; and secondly, what is more important, by having a distinct psychical accompaniment, namely, a feeling of some kind. They are further differenced from reflex actions in that they have a distinctly marked purposive character. It seems probable, moreover, that there is some element of desire or striving towards an end present in instinctive actions though the consciousness of the end is of a very vague character. They are inherited tendencies to act answering to actions of a uniform character and repeated in innumerable instances in the life of the race. The instinctive actions of the lower animals such as the incubation of the female

[1] On the nature of reflex action the reader may consult Dr. Carpenter, *Mental Physiology*, Chap. II., Par. 47, 66, and following; G. H. Lewes, *Physical Basis of Mind*, Prob. IV.; Wundt, *op. cit.*, II., Cap. XXI., pp. 403-412; G. H. Schneider, *Der menschliche Wille*, Kap. II.

bird, the building of cells by bees, and of dams by beavers, are of this type. In man the number of perfect instincts is few. Sucking is one of the best marked examples. When the feeling of hunger arises, and the proper object is present the action follows. As we shall see presently, many actions acquired in early life, such as seizing objects with the hand, sitting upright, walking, are partly instinctive in character, being greatly aided by definite inherited tendencies.

The nature of Instinctive Action has given rise to even more speculation than that of reflex action. The analogy between instinctive and habitual action has already been touched on. This is illustrated by the fact that we commonly describe a perfectly habitual (secondarily-automatic) act as performed 'instinctively'. The distinctly purposive character of instinctive actions in the lower animals, coupled with the want of experience, has led to the somewhat fanciful hypothesis of a power of clairvoyance.[1] The persistent carrying out of instinctive actions when the 'purpose' can no longer be realised (*e.g.*, when a beaver shut up in a room continues to follow out his constructive or dam-building instinct) seems to show that there is no clear representation in the case.[2] The question as to the relation of reflex to instinctive action can hardly be said to be yet settled. Some, as Mr. Spencer, regard instinctive actions as compound reflexes, and G. H. Schneider has recently adopted the same view. But the psychical accompaniment, feeling and striving, seem to differentiate them sufficiently from the others.[3]

[1] See my work on *Pessimism*, p. 118.

[2] Volkmann would distinguish the dark impulse (Trieb) in instinct which springs from an organic sensation and is based on an original physiological 'preformation,' from the desire which is subsequently excited by a perception and the associated images (*op. cit.*, pp. 428, 429).

[3] On the nature of instinctive action see H. Spencer, *Principles of Psychology*, Part IV., Chap. V.; G. J. Romanes, *Animal Intelligence*, p. 10, and following. *Cf.*, *Mental Evolution in Animals*, Chap. XI., and following; Wundt, *op. cit.*, Cap. XVIII., p. 336, and Cap. XXI., p. 415; G. H. Schneider, *Der menschliche Wille*, Part II. The range of instinctive impulse in human life is well brought out by the last writer and by Preyer, *op. cit.*, Cap. XI.

Other Forms of Early Movement. In order to make this brief survey of early movements complete we must touch on one or two other groups. Of these the first are the expressional movements already considered (crying, pouting, &c.) These stand in close connection with instinctive movements in so far as they involve a feeling and are to a considerable extent inherited. They are marked off by the want of purposiveness, and for this reason are commonly excluded from the head of will. But as we shall see presently, they stand in close relation to the simplest and earliest forms of voluntary movement.

Finally, mention may just be made of another group, viz., imitative movements. These appear to be wanting, to a large extent at least, in the element of desire and purpose, though on the other hand they imply a distinct representation of the movement itself. According to the latest observations these manifest themselves at an early period, and greatly aid in the growth of the will. They will have to be considered more fully by and by.[1]

Instinctive Germ of Voluntary Movement. Let us now see how far these simple kinds of movement will supply a starting point in the development of voluntary movement. And to begin with the first, random movement. A child by bringing his limbs into play in this manner would it is clear have experience of

[1] For an interesting account of the early movements see Lotze, *Medicinische Psychologie*, Buch II., Kap. III., § 24 ; Preyer, *Op. cit.*, Cap 8, *et seq.* An exhaustive classification of movements would have to include late acquisitions, and more particularly habitual or secondarily automatic movements. For a more elaborate classification of movements see Carpenter, *Animal Physiology*, Chap. II.

moving his organs, and after a number of these performances would be able to represent the movement. Not only so, he might find that under certain circumstances pleasure resulted from such a random movement. Thus if when a bright object is held out to him he happens to extend his arm and come into contact with it, he will obtain the pleasure of possessing it. After one or more such 'coincidences' he would learn that when an object is held out to him this movement of stretching out his hands will be followed by the enjoyment of handling it. Some have supposed that this is the way in which children uniformly come to do things intelligently and with purpose.[1]

That there is some truth in this theory may be admitted. Unprompted actions may thus lead to voluntary ones. Moreover, the fact emphasised by this theory, that vigorous motor organs involve a disposition to activity, is a circumstance which must be taken into account in seeking to trace the development of will. A vigorous motor system ready to act and to act energetically is a condition of a rapid development of will. Nevertheless this does not supply us with an adequate theory of the way in which voluntary movement arises. It is very doubtful to begin with whether there is any considerable number of strictly unprompted movements.

[1] This is more particularly Prof. Bain's view. He has sought to establish the wide range of such spontaneous movement, especially in early life. And by the aid of his 'Law of Self-Conservation' he endeavours to show that all spontaneous movements bringing pleasure would be directly furthered and prolonged by the increased vitality accompanying the pleasure. See his volume '*The Emotions and the Will*,' 'The Will,' Chap. I.

Many which seem such, as the odd irregular spasmodic movements of infants, are probably responses to faint sensory stimuli internal or external. In view of the small number and the infrequency of purely random movements, it seems unlikely that the number and variety of coincidences required for explaining the origin of voluntary movement on this theory would arise in the way supposed. And observation of young children does not bear out the theory.[1]

Again, some look on reflex action as the starting point in the growth of voluntary movement. As we have just seen, many (if not all) of the so-called unprompted actions are rather reflex in character being responses to peripheral stimuli. The movement known as starting, *e.g.*, at a sudden sound, suggests that by the very structure of the nervous system all sensory stimulation tends to call forth a variety of movements, the range varying with the strength of the stimulus. If this is so, we may understand how a number of purposeless movements would be excited by the constant play of sensory stimuli on the child's organism, which movements might afterwards become voluntary. Thus to take our previous example, the sight of a bright object might call forth a variety of movements, and among others, that of stretching out the hand, and in this way the child would come to know the connection between this particular movement and the result, and so perform it in a voluntary way.

This theory again probably contains an ingredient

[1] See Wundt, *Physiol. Psychologie*, II., Cap. 21, Sect. 1, Preyer, *op. cit.*, Cap. 9.

of truth. A certain range of reflex action, as in starting, might no doubt happen to lead to the happy results supposed. But the theory obviously assumes too much in supposing that the required number and variety of coincidences would arise. And further it overlooks the fact that in the case just referred to there is a distinct element of feeling, the pleasurable excitement caused by the sight of the bright object. This leads us to consider the third class of movements, known as instinctive.

The theory that reflex movement is the starting point in the development of voluntary movement is naturally suggested by the very structure and mode of working of the nervous system, which involves the sequence, sensory stimulation (afferent impulse) and motor innervation (efferent impulse). It is further supported by the fact that this mode of action is the lowest grade of movement in the case of man and the most general and therefore the typical form in that of the animal world as a whole. Hence it has frequently been taken as the starting point in the development of voluntary action in the case of the human individual, *e.g.*, by Lotze, who, however, recognises the possibility of random movements due to processes of assimilation (Stoff-wechsel) in the centres (*op. cit.*, pp. 289-292). Hence, too, Mr. Spencer in tracing the development of will through the animal series takes reflex action as the initial stage. So far as reflex action means simply the conjunction of two nervous processes, a sensory and a motor, this view seems to be just. The first movements of the child are largely if not altogether called forth by sensory stimuli. But if we use the term reflex in the narrow sense so as to exclude instinctive actions, we must be careful to observe the element of feeling which differences the first actions of the child from such reflex movements.

Instinctive movement is (unlearned) movement of a particular kind called forth by a sensory impression, but preceded by feeling, and apparently by a vague element of desire. Now the type of movement out of which voluntary movement emerges is most closely related to this. It may be illustrated by the movements called forth when a child has the sensation of hunger. There seems from the first to be an element of craving or desiring present in the case, though this is of the vaguest kind. The movements continue as long as the pressure of the feeling lasts, and it is out of these blind groping movements prompted by a painful sensation that the required movements (carrying the head to the breast, &c.) grow. This type of movement may conveniently be called Appetitive Movement.[1]

A large proportion of the early movements of the infant appear to be preceded and determined by feeling. It is probable that all sensations (special or organic) when accompanied by a distinct feeling of pleasure or pain are immediately followed by an active impulse of some kind. This in its simplest form is merely the active consciousness attending the outgoing motor impulses. This aspect of it is illustrated in the phenomena of emotional expression, which as we have seen are (to a considerable extent) instinctive movements. All feeling vents itself in movements of some kind. Moreover, as we saw above, all feeling is closely related to the active state of desire. And at the beginning of life expressive movement and appetitive movement are very imperfectly distinguishable.

The latter becomes differenced from the former as soon as the child has reached the first dim consciousness of futurity. Henceforth a pleasurable feeling will prompt to action *for the sake of* its continuance.

[1] Appetite is said to be marked off from desire proper in that it is a craving which springs out of a recurring bodily want, and in its pure or early form does not presuppose experience. (*Cf.* Bain, *Senses and Intellect*, p. 240, *seq.*)

This simple form of striving after something appears very early in life. It is closely related to the act of attending to what is pleasant, in which the non-voluntary form of attention passes into the voluntary.[1]

On the other hand, pain excites movements accompanied by a vague longing for *relief*. Here the properly volitional element of desire or striving appears still more conspicuously. As has been pointed out, instinctive movement, to which this early appetitive movement bears so close an analogy, is determined rather by the pressure (Drang) of painful organic sensations, than by any representation of a resulting pleasure. And appetitive movement itself is evidently a vague striving to get rid of a pain.

The particular direction which these appetitive impulses take in any given case is determined to a considerable extent by inherited nerve-connections. They are thus (in part at least) instinctive movements in the full sense of the term.[2] This applies to a number of movements, such as rubbing or scratching the head, &c., carrying objects to the mouth, stretching out the hand to seize objects, reaching forward with the body, and walking. There seems a definite tendency from the first to respond to certain impressions by certain movements, and also to group

[1] See above, p. 96. Wundt regards the activity of mind shown in the reaction of attention on impressions (apperception) as the fundamental mode of activity, out of which will takes its rise. *Physiol. Psychologie*, Vol. II., p. 385, *seq*.

[2] This seems to be Wundt's view when he says: "As no being in the first utterance of its impulses can have a knowledge of its own movements and their effects, we must regard the movement at the same time as a mechanical effect, grounded in the inherited organisation, of the external sensory stimuli which have excited the feeling". (*Op. cit.*, p. 412.)

movements (*e.g.*, those of the two eyes, two arms, and two legs) in a certain way, though the right movement or combination may only be reached gradually after a series of trials and a process of approximation. On the other hand, some movements may be selected from among a number of heterogeneous movements prompted by a feeling and a vague craving, because they are found to bring relief or pleasure. Thus a child lying in an uncomfortable position may be noticed to execute a number of movements, some of which have little adaptation to the object, till by and by certain movements are hit upon which bring about a more comfortable position.

The germ of voluntary movement may thus be resolved into the following elements. Feeling tends from the first to stir active impulse. As soon as consciousness begins to develop and a vague representation of a future like the present or contrasting with it becomes possible, this prompting of impulse assumes the more distinctly voluntary character of an appetitive movement, with its vague striving towards an end.[1] Random movement may supply a certain experience of movement which is useful. And however this be, the vigour of the active organs and their readiness to act is an important condition of this early development. Again, reflex movements, of which starting is the type, may co-operate to a

[1] The process here is closely analogous to that of natural selection. The urgency of feeling brings about a wide variety of movement, answering to the 'accidental' variations of organic forms. Out of these, certain movements are picked out and pursued which are found to be useful, just as certain forms of structure are preserved when advantageous to their possessors.

very slight extent. And definitely circumscribed reflex movements may be taken up into voluntary, as in the complex act of grasping a thing. Finally, definite instinctive tendencies to perform particular kinds of movement in particular circumstances and under the pressure of particular modes of feeling enter, often in a very disguised way, into voluntary movement, expediting the transformation of the earlier vague appetitive, into the later definite voluntary movement.[1]

Effect of Experience. Thus far we have been dealing with the primitive germs of will, the innate tendencies which underlie the first simple experiments in movement. We have now to consider more carefully the effects of experience, and of the successive performances or exercises of the active organs in the pursuit of the simple ends of early life.

(a) To begin with, when the child acting under the first vague impulse to attain a pleasure or avoid a pain succeeds in performing the appropriate movement the prompting of his will becomes definite. He has now had experience of the attainment of a particular kind of pleasure, and the 'traces' of this subsequently stored up will serve to give definiteness to his impulses. Thus after stretching out his hand again and again and seizing objects, he is able to shape a distinct representation of the pleasure of handling an object, and in this way when occasion

[1] Preyer shows in an interesting way, in the case of learning to stretch out and seize an object, how the will thus appropriates reflex and instinctive elements, *op. cit.*, Cap. XI., p. 152, &c.

arises he will experience a definite desire towards this particular end.

(b) In the second place, this experience of movement brought about by these first vague desires gives precision and definiteness to the particular movement concerned. As we have seen, the first movements are ill-defined and unsteady Experience teaches the child the kind of movement needed to compass his ends. The 'traces of the motor experience persist, and after a time give rise to a distinct motor representation. Thus after several experiences of turning the head, the child is able to picture that particular movement.

This will involve, further, a diminution of effort and an increase of facility in the movement. This will be brought about in part by the very growth of the organ, the strengthening of the muscles. It will be furthered, too, by the repetition of the particular kind of movement. Through the accumulation of motor traces, and the growth of distinct motor representations, the movement will become easier in the sense that it calls for less effort of mind, that is less concentration. Distinctness of representation involves ease and rapidity in the succeeding performance or execution.

(c) In the third place, this effect of experience involves association. To begin with, the end becomes associated with a definite kind of movement. The repeated attainment of a pleasurable experience by means of a particular movement serves to connect the two in the mind, so that the recurrence of the representation of this pleasure and the attendant desire is

at once followed by the representation of the necessary movement. Thus after a little experience the recurrence of the sensation of hunger and the desire for food at once calls forth the appropriate movements, leaning forward, stretching out the hands, opening the mouth, and so on.

In addition to this, the influence of association is seen in the fact that the representation of the end together with the appropriate movement is suggested by the appearance of a particular object or set of circumstances. This early voluntary movement is, as we have seen, a response to sense-impressions. It is the sight of the food, the bath, the favourite toy, and so forth, which excites desire and motor impulse. Desire is now no longer dependent on the presence of an actual sensation pleasurable or painful: it has as its antecedent not a sensation but a percept. It arises upon seeing something related to the end or object of desire.

The growth of these volitional associations illustrates the general laws of retentiveness, the effects of interest, concentration, and repetition. The special power of representing actions and their results turns on a good memory for feeling, and a good discrimination and corresponding retentiveness for motor experiences.

Extension of Range of Movement. While particular modes of voluntary movement are thus being perfected, new modes are being found out and executed. When the child has learnt to use his hands in one way he is in a better position to use them in another way. A fresh situation occurs; his toy falls out of his lap to one side of him. The movements of stretching out the hands already learnt come to his aid. He has a vague representation of what he has to do, and adapts his actions to the new circumstances. In all this we see that the process of acquiring command over the organs is a series of experiments and tentatives, by which vague indefinite promptings are gradually transformed into definite promptings.

By this same process of adapting old attainments to new occasions a child gradually learns to combine movements. Thus he learns to perform simultaneously movements of the two hands, as in holding an apple with one hand and picking out the pips with the other. Similarly he goes on to execute a series of movements, as in stretching out his hand to an object, seizing it, and carrying it to his mouth. If he has already learnt separately the movement of grasping an object, and of carrying one to his mouth, the combination of the two follows when the appropriate circumstances occur. Most of the child's movements are strictly speaking complex movements, and chains of movement. He begins to construct almost as soon as he learns to command his motor organs at all.

Although we commonly speak of new movements being *combined* out of old elements, it is necessary to observe that the widening of the range of movement involves *separation* as well. At first motor excitation tends to diffuse itself and to engage a large number of muscles. This is illustrated in the movements of the tongue, &c., which commonly accompany the first tentatives in writing. Certain groups of movements, *e.g.*, those of the two arms, of the fingers of the same hand, are in a measure co-ordinated from the first, so that a special effort at separating them is needed. Motor construction, like that of new sensory images, thus involves isolation as well as combination.[1]

Imitation. The term imitation is popularly used for the adoption of any movement, feeling, or even peculiarity of thought from others. In mental science it is confined to actions. By an imitative movement is meant one which is called forth directly by the sight of that movement as performed by another. Thus it is an imitative action when a child pouts in response to another's pout.

Imitation implies a connection between the sight of a movement and its actual performance as known through muscular experience. To some extent this connection seems to be instinctive and inherited. Preyer tells us that his child when less than 4 months pouted in response to his father's pout.[2] It seems impossible that his individual experience could have taught him the connection between the *appearance* of the movement and the execution of it. Such an action, like the infant's responsive smile, might be ascribed to the fact that there were inherited nervous connections between the centres of sight and oral movement, involving an original disposition to respond to the lead of another's movement. But though there is probably a certain instinctive ele-

[1] "The will is neither coordinating only, nor isolating only, but both." Preyer, *op. cit.*, 214.

[2] *Op. cit.*, p. 177. This agrees with a remark of Mr. Darwin that his boy appeared to imitate sounds when 4 months old. See his *Biographical Sketch of an Infant*, in *Mind*, Vol. II. (1877), p. 291.

ment in imitation the imitative impulse does not come into full play till about the middle of the 2nd year, that is to say after the child has learnt to perform many actions in the way described above.[1]

Leaving the possibility of instinctive imitation out of account we may say that imitation presupposes a certain experience of movement and a stock of motor acquisitions. It includes the power of framing a distinct representation of a movement apart from the special circumstances and needs which first called it forth. And this power again presupposes special attention to the movement itself at the time of its performance. More particularly it implies that the motor representation has become firmly associated with the particular visual impression which we call the sight or appearance of the movement.

To this it must be added that the impulse to imitate others implies a certain facility in the performance of the action and a corresponding disposition or readiness to perform it again. As we have seen, the repetition of any action makes that action easier, that is diminishes the effort involved. This being so, less motive force would be required to call forth the action.

It must be remembered further that the exercise of the active organs (within limits) is pleasurable, and a child who begins to feel that he is gaining command of his motor organs finds a distinct satisfaction in bringing them into play. He does things (*e.g.*, in romping play) for the pleasure of doing them. Hence

[1] Mr. Darwin *(loc. cit.)* says that his boy when $11\frac{1}{2}$ months old "could readily imitate all sorts of actions". For a detailed account of the growth of the imitative impulse see Preyer, *op. cit.*, Cap. XII.

where a close association has been formed between certain visual impressions and certain movements, the sight of another performing a particular movement may suffice to call it forth. The action is not fully voluntary. There is no distinct element of desire or wish for an end present in the child's mind. At most there is a vague desire for the pleasure of movement, and even this is not, apparently, present in all cases. The impression vividly suggests, and is immediately followed by the action, without any intermediate stage of looking onward and desiring a result.

Imitation is a signal example of the tendency already touched on to carry out any movement vividly suggested at the moment. As was pointed out, a motor representation appears to involve a nascent stage of the process of innervation, and consequently tends to pass into the actual performance of the movement. In closely watching another's movements, *e.g.*, the strokes of a billiard player, we are, as Lotze observes, apt to accompany them with slight movements of the same kind (*Medicinische Psychologie*, p. 293). Other instances of this tendency are the non-voluntary utterances of a person 'thinking aloud'. More striking examples are to be met with in abnormal conditions, in the carrying out of *idées fixes*, or ideas of actions which have for some reason acquired a preternatural persistence in the mind. These are commonly sustained by a strong force of emotion. Mr. Romanes observes that the imitative tendency which shews itself most conspicuously in the more intelligent animals, in savage races, in the insane, and at an early period of child life, "is characteristic of a certain area of mental evolution" (*Mental Evolution in Animals*, p. 225).[1]

Later on this 'unconscious' mechanical imitation tends to become a more conscious and definitely voluntary operation. A child of 6 or 8 imitates the

[1] Wundt rightly remarks that every distinct representation of a movement is attended by an impulse to perform it (*Physiolog. Psychologie*, II., p. 390). For a fuller account of the process involved the reader should consult Dr. Carpenter's account of Ideo-motor action, *Mental Physiology*, Bk. I., Chap. VI., Sect. 3, and Dr. Bain's illustration of the influence of Fixed Ideas on action. *The Emotions and the Will*, Pt. II., Chap. V., Sect. 5.

actions of others under the influence of a conscious desire to do what others do. The motive here seems to be in part the love of display assuming the particular form of rivalry, or a wish to equal or outstrip others. A child likes to show his powers, to prove that he can do what he sees other children do. On the other hand, the motive is closely connected with social feelings, with affection and admiration for others. Thus a boy thinks it a fine thing to imitate the actions of his father or his elder brother. Where there is strong affection for a parent or teacher the impulse to follow their lead will be more powerful. We thus see that imitation is closely related to sympathy both in itself and in its conditions.[1]

So far we have supposed that the imitative movement is a faithful reproduction of an action that has been previously acquired under the pressure of some special desire, and this frequently happens. Thus, children open their mouths, shout, and so forth, in response to the lead of others' movements. But imitation is much more than this. The child imitates new actions. Thus the infant learns to wave his hand in response to the action of the mother. Here, however, the same conditions are presupposed. A certain range of motor acquisition related to the new movement seems always to precede such constructive imitation. This is strikingly illustrated in the case of vocal imitation, which is preceded by a certain stage of spontaneous or feeling-prompted exercise of the organ.[2]

[1] The impulse of imitation takes on a special form in the artistic or creative propensity.

[2] *Cf.* above, pp. 314, 315.

The tendency to imitate those about us is a very important aid to the development of the will. From the very earliest it co-operates with the force of the child's spontaneous desires, and so tends greatly to shorten the process of acquisition in the case of useful movements which he would otherwise perform. Thus a child thrown with other children learns to walk more quickly than one cut off from the example of others. And example tends to suggest a large variety of new modes of movement, and so to enlarge very much the range of action. We see this exemplified in a striking manner in the reproduction of tricks of gesture, vocal combination, &c., of other children about the end of the third year.

Children vary much in the strength of the imitative impulse. This is partly connected with unequal degrees of vigour in the active organs. An energetic active child will be more disposed to pick up the actions of others than a feeble lethargic child. Much, too, will depend on the closeness of attention to the visible effects of movements, when performed by the child himself and by others. Finally the strength of the impulse to imitate others will vary much with the emotional temperament. There are children strongly disposed to fall in with the ways of others, to rely on their authority, to follow their lead. These are especially imitative. Others again of a more independent self-assertive turn of mind are apt to strike out their own modes of action. Such are much less influenced by example and the impulse of imitation.

Movement and Verbal Suggestion: the Word of

Command. Very closely related to imitative movement, is movement called forth by some arbitrarily attached sign, and more particularly some verbal sign. This is illustrated in movements in response to command. These imply a still higher degree of the power of distinctly representing or picturing a movement apart from the desire for any special result which follows in particular circumstances. In order to perform them the child must be able to detach the movement from its attendant circumstances and make it an object of separate attention. There is further involved here an association between an action and a verbal sign.

This connection, unlike that between a movement and its visible effect, is an artificial one, and as such has to be built up by a process of teaching or discipline. Thus the dog comes to respond to verbal or other signs as 'go back,' 'lie down,' by a system of training. Many repetitions of the command coupled by 'interpretations' of its meaning are necessary before the association becomes perfect. But when it is perfect, the sound of the command calls up the appropriate movement with scarcely any conscious element of desire. Similarly in the case of the disciplined child. The mere suggestion of a command calls forth a prompt response. This is illustrated in the movements of a Kindergarten class or a drilling class. Here again we see that when a thoroughly acquired movement is vividly suggested we are disposed to follow it out with little reference to its consequences.

Through the medium of language the child's movements come to a large extent under the guidance and control of others. Our elaborate terminology for the several parts of the body and their various movements enables a mother or teacher to give the child minute directions as to his movements. If only there is a vigorous active system and a faint wish to please, the suggestion of a movement will commonly suffice to call it forth. Thus the mother suggests that the child should run in the garden and play a while, and the suggestion is at once followed out.

Through these associations with words the educator has an additional means of calling forth new modes of movement. Having for example learnt the meaning of 'Hold the head up,' 'Keep the arms straight down,' the drilling master is able to call forth the combination of these movements. Children are daily acquiring new modes of movement under the verbal direction or guidance of their parents, teachers, playmates, &c.

Internal Command of Movement. In all the forms of movement considered so far action occurs in response to external impressions. It arises on occasion either of a sensation, or of a perception (of an object, movement, word, &c.). A higher stage is reached when movement becomes detached from external impressions, and follows an internal process of imagination. In this way it becomes centrally or internally initiated or excited. Thus a child may as the result of a process of suggestion think of a particular toy put away somewhere, and experiencing the desire to play with it carry out the necessary movements.

From the ability to perform a particular movement whenever a wish arises for a definite result, the child easily passes to the ability to move when he wishes to do so apart from any special result. This power of internal, independent motor representation (apart from external impressions) appears to involve a considerable degree of facility in the performance of the movement, and a proportionate readiness to carry it out. Hence a certain tendency to movement whenever the motor representation arises, even where there is no special purpose to be gained at the time. This being so the recurrence of so slight a desire as the mere wish to move an organ, suffices to excite or call forth the movement. This ability to move from the mere desire or wish to move constitutes in the full sense the internal command of the bodily organs, the bringing of them under the sway of internal processes of representation (imagining and wishing) and the setting them free from the influence of external circumstances.

The process of working up old motor attainments into new forms is perfected by this internal command of the active organs. It is only when the child is able at will to move his several organs and more particularly his arms, hands, and fingers, steadily and easily in various directions, that he is in a position to go on rapidly to new and more complex motor attainments.

This attainment of a wide and perfect command of the bodily organs involves the growth of will in more ways than one. As has been remarked, all external actions, including the most elaborate processes of moral conduct, are carried out by means of movements of various kinds. The command of the motor organs is thus a necessary preliminary to the higher kinds of action. Not only so, the very process of acquiring this command of movement implies the exercise in a rudimentary form of the higher voluntary powers, and more particularly persistence in effort and trial, determination to overcome difficulties, and practical intelligence in comparing and choosing between alternatives. Anybody who watches an infant trying to combine manual movements so as to raise or turn over an intractable object, may see how in this early and crude form of action the attributes of the higher volition begin to manifest themselves.

Movement and Habit. The term habit is commonly used with reference to any recurring mode of mental operation, as 'habit of thought'. More strictly it is confined to mental phenomena lying within the region of will or action. In this region it indicates the full or extreme effect of repetition and of association. We do a thing from habit when we give the action the minimum of attention, and when there is no distinct element of desire or purpose present in the case. A habitual action has in its uniform undeviating character, as well as in its want of a distinctly conscious element, a quasi-mechanical character, and so resembles reflex and instinctive actions. Hence, as already observed, habitual actions are often said to be performed 'instinctively' or automatically.[1]

As we have seen, every movement tends by frequent performance to grow easy. There remains a 'disposition' to perform it whenever it is suggested, and

[1] Habitual action has been called 'secondarily automatic' to distinguish it from primarily automatic or reflex action. See Carpenter's *Mental Physiology*, pp. 16-24.

apart from any strong promptings of desire. This disposition implies not only a psychological fact, a greater readiness to perform the particular action, but a physiological fact, namely a modification of the nerve-structures concerned. This fixed disposition or tendency, produced by repetition and practice, to act in a given way in response to the slightest stimulus is one ingredient in what we call habit.

The second constituent of habit is the close association between a definite movement and a certain external impression, by virtue of which the latter calls forth the former immediately and without any intermediate stage of distinct volition or even motor representation. When a person under the force of habit takes out his latch-key in arriving at the door of a house at which he is staying, the explanation is that the sight of the door instantly suggests and calls forth the action associated with the object. Here again we have as the physiological groundwork a 'coordination' or organic connection of the nerve-centres concerned.

As an illustration of the principle of habit, we may instance movement under command when made prompt and unreflecting by practice. The movements of a perfectly trained soldier, the actions of a signalman in response to instructions sent him, exhibit this mechanical and quasi-reflex character in a high degree. In a less marked degree habit enters into most of our customary every day movements.

Habit and Complex Movements. When a number of movements are combined, the frequent performance of these in combination, tends to consolidate the separate links, so that each step calls up the succeeding ones without a distinct intervention of consciousness. Simple examples of this are to be found in the series of movements involved in walking, swimming, dancing, in playing a piece of music from memory, reciting a familiar poem, and so on.

Such chains of action approximate in character to the sequences of movement in breathing, and other movements into which consciousness from the first enters but faintly. These rapid and half-conscious series of movements imply that the nervous centres concerned have become perfectly co-ordinated so that the action of one at once excites the corresponding activity of the others.[1] The only element of volitioı is at the outset (*e.g.*, deciding to go out for a walk, sitting down to the piano to play, and so on). When the familiar series has been started the mind may be so little occupied as to be able to attend to other matters. Thus a person may carry on a train of thought while walking, or engage in conversation while playing a well-known piece of music.

Such chains of movement not only lack distinct volitional impulses, but also distinct motor representations. As we saw above (p. 247) a succession of movements consists of a chain of motor experiences and of sensory impressions (sounds, touches). When often repeated the muscular experience together with the passive sensation attending the execution of any step in the movement appears at once to excite the next movement without the intervention of a distinct representation of this movement.[2] The fact that the intrusion of a volitional impulse in

[1] See Carpenter, *op. cit.*, p. 75.

[2] Wundt seeks to trace the successive stages of habitual or secondarily automatic actions. From being fully voluntary they grow first into impulsive movements (Trieb-bewegungen), involving a preceding conscious sensation (often a sensation of movement) and accompanied by a feeling of satisfied impulse, then, finally, into perfectly reflex, inasmuch as the element of sensation disappears out of consciousness (*op. cit.*, p. 415).

the shape of an effort of attention distinctly deranges such a habitual train suggests that this mechanical effect depends on the co-ordination of certain lower centres the action of which is interfered with ('inhibited') by the influence of the higher centres of volition.

Habit and Routine. In a measure all customary successions of movement illustrate the effect of the principle of habit. The performance of one action or chain of actions suggests and excites its usual successor. In this way much of our daily routine tends to take on a semi-automatic character. Thus the man of routine passes with only a faint or nascent volitional impulse from the meal to the walk, from the walk to the business of the day, and so forth. That this force of habit involves a process of physiological adjustment is seen in the fact that the due succession brings a certain satisfaction to the mind, while any interruption of the customary sequence produces a feeling of distress analogous to that which accompanies the obstruction of a natural instinct.

What we ordinarily call the force of habit includes not only this tendency in one group of actions to call forth their customary successors, but further the fixing of certain feelings and desires as periodic. The man of routine tends to do all things, even to seek his amusements, in a regular periodic fashion. In this respect habit or 'second nature' still further resembles instinctive impulse, which is determined in the first place by recurring organic sensations.

Strength of Habit. Habits (like associations between representations) are of very different degrees of strength. The degree of perfection of a habit may be estimated by the promptness, and uniformity of the active response to stimulus. Thus the soldier's response to an order is 'mechanically perfect' when it follows immediately and in every case. The strength of a habit may be estimated in other ways also. It follows from the above account of the mechanism of habit, that it is a tendency to a special kind of action which is physiologically better organised than those accompanied by clear consciousness. It is thus a force which it is difficult for deliberate volition to reach and counteract. And the strength of a habit may be estimated by the difficulty of modifying the customary succession.[1]

Conditions of the Strength of Habit. The conditions on which the strength of a habit depends are (1) the amount of motive force brought to bear and of attention given at the outset in order to make the action perfect. The action must it is obvious be perfect as a voluntary one before it becomes habitual. The will must itself gain full possession of an action before it can hand it over to its subordinate, habit. (2) The frequency with which the action has been performed. Repetition is the great means of fixing movement in the channels of habit. (3) The uniformity or continuity of its performance in like circumstances. The importance of not intermitting the performance of an action is known to every parent and teacher. For example a child may put away his toys after playing with them a good many times, and yet not acquire a habit of doing so, if he now and again omits to perform the action. A perfect habit presupposes a certain length of unbroken or unvarying experience.

[1] The strength of the active impulse may also be measured by the degree of discomfort arising from a checking or hindering of the habit. But this characteristic of habit is best illustrated in the higher and more complex type of action.

It is to be added that the growth of habit is much easier in the early 'plastic' period of life than later on. A more extended process of acquisition, a larger number of repetitions are needed to fix action in a definite direction in later years.[1] The habitual modes of movement acquired in early life commonly cling to the child to the end. His peculiar carriage and gait, his mode of articulation and intonation, his way of doing all the homely performances of everyday life, all illustrate the effect of early habituation.

Learning and Unlearning Habit. There is another reason why it is so much more difficult to form a new habit as life advances. It commonly involves the unlearning of an old habit. The problem is thus greatly complicated. A child that has acquired an awkward way of sitting, or unpleasant tricks of manner, gives special difficulty to the educator. In order to build up the new habit he has to work against the resisting force of the old one. Movement tends to set in the old direction, and many a painful effort is needed to check the current.

Fixity and Plasticity of Movement. A good many of our recurring daily movements illustrate the principle of habit. So large a part of our life is a recurrence of similar circumstances and similar needs, that it is well for our actions to grow habitual to a considerable extent. The actions by which we care for the needs of the body, our behaviour before others, and so forth, are dominated by this principle. In this way nerve-energy is economised and the powers of the mind

[1] This is connected with the special plasticity or adaptability of the nervous system at this period. (See Carpenter, *loc. cit.*)

are left free for other matters. Wherever the same (or similar) circumstances frequently recur and call for like modes of action, the co-operation of the principle of habit is a clear gain.

At the same time human life differs from animal life in the greater degree of its complexity and variability. We are not furnished with an outfit of 'instincts' to start with as the lower animals are. And this fact suggests that much of our life consists in modifying our movements and adapting them to new circumstances. The growth of will implies thus a twofold process: (*a*) the *deepening* of particular active aptitudes and tendencies, that is the fixing of oft-repeated actions in a definite and unvarying form; (*b*) the *widening* of these active capabilities by a constant variation of old actions, by new adaptations, or special combinations suited to the particular circumstances of the time.

The Training of the Will and the Exercise of the Active Organs. The exercise of the muscular organs belongs in part to what is called physical education. It is carried on to a considerable extent for purposes of bodily health. The march and dance of the Kindergarten, the drilling lesson of the school have a direct reference to health, and are dictated by the rule 'A healthy mind in a healthy body'. Not only so, bodily practice is carried on to a large extent for the sake of attaining some distinctly physical excellence, a well developed physique, robustness and agility of limb. This applies to the training of the Greek youth which had a military significance, the training of the modern runner, oarsman, and so on.

On the other hand, the exercise of the active organs stands in a close relation to intellectual education. This applies more particularly to the hand and the voice. Teaching children to speak distinctly, to read, and to write, is commonly looked on as a part of intellectual instruction. It is obvious that these actions largely subserve the ends of knowledge, and are indeed necessary to the taking in and giving out of knowledge.

While the special exercise of the active organs in particular directions seems thus to fall under physical or intellectual training, the general exercise of them comes more appropriately under the head of moral training. As we have seen, the growth of the will begins with the attainment of the power of commanding the organs of movement. The outgoings of desire or active impulse first appear in connection with movement. It is in movement that clear purpose and intention first display themselves. And it is here that perseverance in trial and resolution first manifest themselves. Further, all the higher actions of life depend on the attainment of a general control of the bodily organs. Consequently the exercising of these capabilities involves a rudimentary training of the will. All practice in doing things, then, whatever its primary object may be, is to some extent a strengthening of volitional power.

It should be borne in mind at the outset that children are disposed to activity and in their self-appointed occupations and play show that they are capable of making real progress without any direct control from parent or teacher. The young child should from the beginning have ample opportunity for exercising his active organs. His nursery and his playground should be provided with objects fitted to call forth movement, manual and bodily. The important part played by imitation in the growth of voluntary movement suggests the advantages of companionship in these early occupations. A child is stimulated by the sight of others doing some new thing.[1]

The special province of the educator in the training of the will in the performance of bodily movement begins with showing the child how to do things. This requires judgment. It is better for the child to find out the way to do a thing for himself where he can, just as it is better for him to discover a fact or a truth for himself. Nothing is more fatal to growth of will than that indolence which shrinks from trial and experiment, and which comes

[1] Social games have a further and more distinctly *moral* effect in that they cultivate the power of united action.

helplessly to parent or nurse crying 'What shall I do?' or 'Do this for me'. But there are many things which the child obviously cannot do with the best of wills. Hence an occasional intrusion into children's play with new suggestions will often prove a useful stimulus and encouragement to renewed activity.

From the first the child has to be taught to obey, to do things when he is told to do them. Thus he is required to sit at table and eat his food in a certain way, and so forth. Here the educator becomes in a new and more important sense the trainer of the child's will. As we have seen, movement under command is one important stage in the growth of voluntary action. The exercise of a firm but wise discipline in this early stage of youth will do more than anything else to strengthen voluntary power. Hence the importance of making the connection between command and action as close as possible, so that the responses may be certain and prompt. Here it is desirable not only to observe the general conditions of a wise and effective authority, but to consult the child's powers, not to demand what is beyond these, and even to consider his varying degrees of readiness to act. When the mother or teacher has succeeded in gaining a perfect control over the child's actions the power of educating the young will is greatly enlarged.

Almost all school exercises involve the co-operation of the child's active powers to some extent. Even the oral lesson demands that children should take up a certain bodily attitude, and keep the head and the eyes fixed in a particular direction. The reading and writing lessons and the drilling lesson all call forth activity in their special way. The great agency here is still command supplemented by example or showing the child how to perform the required movement. The impulses of imitation should be appealed to, so as to realise the full benefit of educating children in numbers.

It must never be forgotten that the growth of the active powers, like other mental growth, is a gradual process. The ready command of the active organs is the result of a long series of experiences. The child may of course fail to execute the required movement because he is not concentrating his mind on what he is doing. Then the teacher is justified in blaming him. If however, as often happens, the failure is the result of insufficient preparatory exercise of the organ concerned, the blame rather falls on the teacher for imposing an unsuitable task. The careful graduation of work according to capability is well illustrated in teaching deaf mutes to speak by a process of imitative movement. The teacher begins with movements of the external parts of the body which are distinctly visible to the child when he himself performs them. Only after a certain practice of the imitative capability in this simple form does he go on to call forth the more delicate and hidden movements of the organ of articulation by the aid of the sense of touch.

A proper understanding of the principle of habit is a matter of great importance to the teacher. Throughout the whole of practical training, from the acquisition of those simple actions which enter into good manners, up to the most elaborate manual and vocal performances, the force of habit is called into requisition. In teaching a child to talk, to write, to be well-behaved, and so on, the teacher aims at bringing about an easy, rapid, and quasi-mechanical mode of action. The conditions necessary to the formation of habit need to be attended to. Thus the educator should be careful to supply a certain strength of inducement at the outset so as to overcome the mental inertia, or some opposed natural impulse of the pupil, and to insist uniformly on the performance of the action when the circumstances recur. It may be added that a clear recognition of the truth that a perfect habit represents a long series of repetitions, will tend to make the teacher patient and hopeful.

APPENDIX.

On the different classes of movement see Carpenter's *Mental Physiology* (4th Ed.), Ch. II. On the growth of voluntary movement the reader may compare the views of Bain, *The Emotions and the Will*, Part II., Chaps. I.-III.; H. Spencer, *Principles of Psychology*, I., Pt. IV., Ch. IX.; and G. H. Lewes, *Problems of Life and Mind*, 3rd Series, Vol. II., Problem III., Chap. XIII. The reader of German will do well to consult the following works: Th. Waitz, *Lehrbuch der Psychologie*, § 40, 41; W. Wundt, *Physiologische Psychologie*, Vol. II., pp. 383-395; *cf.* pp. 333-343; W. Preyer, *Die Seele des Kindes*, Part II.; and G. H. Schneider, *Der menschliche Wille.*

On the relation of Bodily Training to Education see Waitz, *Allgemeine Pædagogik*, § 7. On the bearings of the principle of Habit on Education, see P. Radestock, *Die Gewöhnung und ihre Bedeutung für die Erziehung.*

CHAPTER XIV.

COMPLEX ACTION: CONDUCT.

In the previous chapter we have traced the process by which the child acquires the command of his moving organs. It is in bringing these into play that he first exercises his power of will. And until he has become capable of performing this and that movement, and combination of movements, at will, he is not in a position to carry out those higher actions in which the fully developed will manifests itself. These complex actions always involve muscular actions of some kind. What marks off this higher region of action from that of movement is not so much the complexity of the movements themselves, as the amount of reflection (anticipation, &c.) and the degree of complexity of the feelings or motives which enter into them. Early action is characterised by impulsiveness, late action by rationality or 'thoughtfulness'.

This is seen in the everyday use of language. We commonly call an action a movement when little representativeness enters into it, and when the movement itself is the chief part of the whole process. On the other hand we dignify it by the term action, when the results of the movement, so far as they are represented, become a prominent feature.

Thus stretching out the arm in imitation of another is a movement: whereas the same movement if performed in order to present something to another would be called an action. The relation is seen too in the fact that very different movements if leading to the same kind of result, and having the same motive, would be spoken of as one and the same kind of action.

Growth of Intellectual Power and Growth of Will. This transformation of simple into complex action is brought about to a considerable extent by the progress of experience and the growth of a higher capability of representation. This shows itself most conspicuously in the increase of prevision or foresight. At first, action is directed to an immediate result. The child is concerned with some enjoyment which follows closely on a movement or short series of movements. As experiences widen, and the powers of intelligence expand, he takes a further look into the future. He finds out that his actions have remote as well as near consequences. For example, he breaks his toy in a fit of passion and finds there is no toy left to play with. On the other hand, he may, under the impulse of imitation, put some fresh-plucked flowers in a glass of water, and find that they are fresh and fragrant on the morrow. By such experiences he is led to reflect, to "look ahead," to consider his action in relation to remote as well as near results. When the power of representation is sufficiently strong the consideration of these remote results supplies the initial motive to action. The child begins to aim at distant good. For instance, he puts by his sweetmeats in order to enjoy them to-morrow. Or he sows seed in the garden in order to see the flowers months afterwards.

The growth of intelligence and of representative power will not only enlarge the child's view of ends of action, but will at the same time widen his command of means. It is obvious, indeed, that the recognition of the dependence of a remote result on an action will enlarge his idea of his own capabilities and resources. This enlargement of his view of available means to desired ends will be further effected by the development of the power of associating a number of representations in a series or train. When this point of intellectual growth is reached the child will learn to connect a succession of single actions as a group of means subserving the same end. Thus, to revert to one of the above examples, the young gardener will come to recognise the dependence of the desired result, the fully grown plant, on a prolonged activity, or a continued line of action, sowing the seed, watering the young plant, weeding, and so forth. In this way action will gain in complexity by becoming consolidated into series of actions, all the parts of which are united as means to a common end, and as progressive stages in the attainment of this end.[1]

Growth of Feeling and Growth of Will. Just as the growth of will is aided by the development of intelligence or knowledge, so it is furthered by the growth of feeling. Since, as we saw above, feeling supplies, in the shape of desire, the spring or impelling force of volition, progress in the capacity of

[1] The relation is even closer than this: for not only does the result depend on the whole series taken together, each member of the series depends on the carrying out of the preceding steps.

feeling must tend to advance the development of the will.

In studying the early growth of will we assumed that only the simpler feelings came into play. The command of the bodily organs is gained to a considerable extent under the stimulus of the sense-feelings. The first desires and aversions which rouse the muscular organs are connected with the pleasures and pains of the bodily life and the senses. With these impulses there co-operate from an early period the forces of the simpler and earlier emotions, such as the love of activity and of displaying power, curiosity or the desire to inspect and find out about things. The effect of the first awaking of social feeling is seen in the play of imitation and of the impulse to obey commands, which as we have found contribute, in an important measure, to the acquirement of this command over movement.

As the feelings grow in number the active powers are called forth by a larger variety of desires. Thus the child begins to do things for the sake of earning praise, of giving pleasure to others, or of doing what is right. Every such advance in emotional development tends to widen the range of desire, and so to multiply the motives to action. As life progresses the will is prompted by a larger and larger number of desires.

It is to be observed that the effect of this development of the feelings and desires involves a further increase in the degree of representativeness of action. As we saw above, the higher feelings are marked off from the lower by their greater complexity and representativeness. Accordingly, as action comes under the dominion of these higher feelings it necessarily becomes enriched by many new elements of reflection. Thus a child who aims at winning the commendation of his parent or teacher is representing a remote result of his action, how it will appear to another's eye, affect another's mind, and modify the relation between himself and that other.

Aiming at Permanent Ends. As a further result of this development of intelligence and emotion the ends of action become greatly enlarged or expanded. The child comes to apprehend the existence of enduring interests, permanent conditions of pleasure which constitute happiness. In this way he learns to regard health, knowledge, reputation, and so on, as things which last, which are of value to-day and to-morrow alike, and which form parts of the enduring good of life. Similarly he comes to apprehend a larger or wider good than his personal happiness, the interests of his family, his school, his country, and of mankind at large.

When his mind is able to seize these comprehensive and enduring ends his action becomes intelligent or rational in a new sense. He now acts with a reference not merely to immediate results in the present case but to the bearing of his action on this sum of permanent good. Thus he will be industrious in pursuing knowledge not only for the pleasure which every new acquisition of knowledge brings directly, but for the sake of the permanent value of this knowledge. Similarly he will seek to please his teacher not simply with a view to the immediate advantages which the action brings, but with the thought of improving his permanent relations with his teacher, gaining a higher place in his esteem, and so on.

When the child begins to view each individual action in its bearing on some portion of his lasting welfare, his actions become united and consolidated into what we call conduct. Impulse as an isolated prompting for this or that particular enjoyment becomes transformed into comprehensive aim and rational motive. Or to express the change otherwise, action becomes pervaded and regulated by principle. The child consciously or unconsciously begins to refer to a general precept or maxim of action, as 'maintain health,' 'seek knowledge,' 'be good,' and so forth. Particular actions are thus united under a common rule, they are viewed as members of a class of actions subserving one comprehensive end. In this way the will attains a measure of unity.

Nature of Permanent Ends: Desiring Means as Ends. The pursuit of these permanent ends illustrates in a specially distinct form the tendency in all desire to fix the attention on the conditions of, or means of realising, the pleasure desired. As was pointed out above, the desire for a thing begets a desire for the action which is seen to lead on to the realisation of it. In all action the mind is required to fix itself on the immediate result of the act, as that which guides and controls the action. Hence the tendency to erect this proximate result into an end. Thus if a boy feels cold and goes to shut the door, the closed door becomes the immediate object of his action. For the moment he loses sight of the feelings of cold, and of the desired warmth, and is occupied in shutting the door. If an obstacle occurs, as when the latch does not answer, he becomes wholly absorbed in this secondary end. In the case of pursuing money, health, &c., this preoccupation of the mind with means becomes still more marked. Money represents many alternative possibilities of avoiding ill and realising good. The mind cannot, it is obvious, represent even a small part of these at one time. Hence the sinking back into indistinct consciousness of the primary end, or ends, and the engagement of the attention by the secondary or derivative end.

It is to be remarked that in all these cases of transforming means into ends, an independent desire for the means as a good in itself usually co-operates in the later stages. Thus in the example given above, the boy if impeded in his desire to shut the door will come under the stimulus of the desire to display his muscular strength or skill. The same thing is true in the case of a pursuit of knowledge. As already shown, a child begins to seek it for the sake of something else, or as means to an end, but gradually discovers something desirable in the knowledge itself.[1]

These permanent or aggregated ends illustrate the fact that mental development on each of its three sides tends towards generality. In the desire for health, property, truth, virtue, or happiness, the impulse seems, as already observed, to attach itself to a general or abstract idea. The object desired here takes on the form of a highly representative, or re-representative idea ; and this in a double way. First of all, as was just pointed out, the desire for a particular portion of wealth or knowledge implies a kind of condensed symbolic representation of a large variety of pleasures. In the second place, what is known as the general desire for any one of these ends involves a readiness to pursue it at all times, and under all forms. Thus a man may be said to have a general desire for scientific knowledge when he is inclined to seek it and to promote it to the best of his ability under all circumstances. This state of mind seems to involve the attachment of a certain calm impulse of desire to the corresponding abstract symbol or general name.[2]

Complex Action. Action, as we have seen, gains in representativeness as the mind of the agent takes remote consequences into account. And this increase of representativeness implies an increase in complexity. By a complex action is meant here one which is not the result of a single impulse tending towards an

[1] This is precisely similar to the growth of an intrinsic interest out of a reflected one already described (p. 93).

[2] It has been assumed here that these highly intellectual or rational ends owe their force as objects of desire to their relation to our pleasures and pains. Their apparent dissimilarity to the lower motives, in which the element of feeling is much more conspicuous, is on this supposition referred to their highly representative or intellectualised character. For the opposite view that mere intelligence or reason (apart from feeling) may supply a motive force, see Mr. H. Sidgwick's discussion of the relation of pleasure to desire already referred to (*Method of Ethics*, Book I., Chap. IV.).

immediate end, but involves a plurality of impulses, a representation of a number of objects of desire or aversion, and so an expansion and complication of the internal representative process.

This expansion of the representative stage of action assumes one of two very unlike forms. In the first place, the desires or impulses simultaneously called up may be harmonious and co-operative, converging towards the same action. In the second place, the desires may be discordant and opposed, or diverging into different lines of action.

(A) **Co-operation of Impulses.** The combination of desires or impulses tending in the same direction is by no means an unfrequent experience. Many actions which seem at first sight to have but one impelling motive will be found on closer inspection to have a number. Thus, to take a simple example, the action of a child in response to a request from his mother may be the result not simply of a desire to please, but of a wish to reap some personal advantage following from the action. Here there is clearly a more complex process of desire; at the same time, since the different currents of impulse set in the same direction, the resulting action is rather expedited than delayed.

Action as Pleasurable or Painful. The most interesting example of this co-operation of desires is when in addition to the primary impulse related to the pleasure following the action there presents itself a secondary impulse related to the activity itself. As we saw above, we may be said in all cases of voluntary action to desire the action in a subordinate way, as means to an end. But in some cases we distinctly represent the action as intrinsically pleasurable. In all such cases the action becomes complex by a composition of impulses. To the initial impulse to realise some end there is added another, to follow out an agreeable line of action. We are frequently determined to some extent to act by such a representation of an agreeable mode of activity. In all sportive or play-like action this secondary impulse attains a special degree of prominence.

Although the desire for the pleasure of the action is here spoken of as secondary, it is not meant that it is in all cases the less potent factor. The proportion of intensity between the desire for the result or the end and for the means may vary within wide limits. In some cases the representation of the pleasure of doing a thing is subordinate and semi-conscious. In other cases it becomes the dominant force. This is true of most games where the interest turns largely on the pleasure of physical exercise or intellectual activity (search for a solution, constructive activity). In some cases the desire for the pleasure of an action becomes the initial and sole motive. This applies to a large part of imitative action. In most cases, however, the desire to do a thing for the pleasure of doing it is prompted by the suggestion of some pleasurable result.[1]

(B) **Opposition of Impulses.** The second variety of complex action in which two (or more) impulses come into antagonism and conflict is much more important than the other. Owing to the circumstance of antagonism the representative or reflective stage of the action becomes much more prolonged and compli-

[1] Mr. Sidgwick regards the case of pleasures of pursuit, as illustrated in field-sports, as supporting the theory that pleasure is not always the object of desire. The sportsman must desire the result of the chase, that is something intrinsically non-pleasurable and indifferent, in order to enjoy the pleasure of the activity (*The Methods of Ethics*, Book I., Chap. IV.). This case, which is undoubtedly a difficult one, seems to illustrate the co-operation of a secondary desire for the action with a primary desire for its result.

cated than in the case of co-operating impulses. And in addition to its special psychological importance this type of action has a peculiar interest from an ethical point of view. For moral conduct, or obedience to the moral law, is the outcome of this mode of complex action.

Arrest of Action: Inhibition. This variety of complex action is characterised by the presence of a new element, the arrest or inhibition of action. Whenever two impulses or tendencies arise simultaneously or in close succession having different directions, each serves to check and counteract the other. Hence there arises an arrest of action, which may be temporary only, leading to a delay or postponement of the action, or final, ending in a complete suppression of the action.[1] This inhibitory effect of one desire or impulse on another is closely analogous to the effect of one object in drawing off the attention from another object. Just as the mind is able to attend to one impression only at a time, so that the solicitation of attention in one direction checks the movement of it in another; so only one impulse to action can be carried out at a given time, and any other impulse tending in another direction serves to check or frustrate the first.

Physiological Conditions of Arrest. Much has been written respecting the physiological conditions of arrest or inhibition. Just as all clear consciousness seems to depend on a concentration of nerve-energy in certain channels, and a corresponding repression of it in others (the correlative of *mental* concentration), so it appears probable

[1] Since there may be no completed action in this case, there seems an inappropriateness in bringing the phenomenon under the head of complex action, yet it clearly involves active elements, and may be described as a truncated action.

that the excitation of any region of the motor centres involves some influence unfavourable to the simultaneous excitation of other motor structures. According to this view the arrest of impulse by reflection, to be spoken of presently, involves an opposing nervous current issuing from the higher motor centres, including those of attention, and passing downwards to the lower motor centres excited by the impulse. That there is such a counteractive nervous influence concerned seems likely from the fact that the restraint of movement (*e.g.*, in a moment of passion) is often accompanied by a vigorous contraction of other muscles the action of which serves as a counterpoise to the tendency to movement. As to the exact nature of this interference of nervous processes little is known. It is possible that it resembles the interference of light and sound vibrations. There is much to support the theory that the nervous process consists in the propagation of molecular vibrations somewhat analogous to that of ether vibrations underlying the phenomena of light; and this theory implies the possibility of such interference.[1]

Action Arrested by Doubt. The simplest case of arrested or inhibited action is that in which the belief necessary to the carrying out of an impulse is checked. Children are, as we have seen, prone to be confident, and this confidence shows itself in their action. Their first experiments in movement are performed with a perfect assurance that they will succeed. And a look of perplexity is apt to come over their features when they first encounter failure, as in trying to lift a heavy body from the ground. These failures suggest uncertainty, and a sense of uncertainty or doubt arrests or temporarily paralyses action. Thus a child who has had experience of his inability to lift heavy bodies, has his impulse checked the next time he desires to lift a heavy-looking object.

This arrest will be temporary or complete and final

[1] On the physiological nature of inhibition, and the question of special centres of inhibition, see G. H. Lewes, *Problems of Life and Mind,* Second Series *(Physical Basis of Mind),* Chap. VIII., pp. 293-301; Hermann, *Human Physiology,* p. 480, *seq.* Ferrier, *The Functions of the Brain,* § 102.

according to the circumstances, such as the strength of the impulse, and of the disposition to act at the time. Differences of temperament, too, will affect the result. A vigorous motor system, involving energetic impulses to action, is unfavourable to doubt.[1] A cautious temperament appears to be related to a certain degree of moderation in the active impulses. To this it must be added that the contrast will involve a difference in the degree of retentiveness for feelings. The memory for pleasure does not vary exactly as the memory for pain. The hopeful temperament involves a specially good memory for pleasures, the cautious, apprehensive temperament, a specially good memory for pains.

Recoil of Desire: Deterrents from Action. The second kind of arrest occurs when the mind is impelled towards a certain action under the influence of a desire for some pleasure, and at the same time the action is represented as having some painful accompaniment or result. In this case the positive desire to act for the sake of a pleasure is opposed by the negative desire, or the aversion to this same action. And so far as this shrinking from a painful experience frustrates the positive impulse, we are said to be deterred from the action.

The deterring force may reside either in the representation of the action itself as disagreeable, or in the representation of it as leading to a disagreeable result.

[1] *Cf.* above, pp. 404, 405. For a fuller account of this influence of activity on belief see the chapter on 'Belief' in *Sensation and Intuition*, pp. 111, 112.

The first case is illustrated in the want of alacrity in action in states of indolence. In such a condition there is not only the want of the auxiliary force, desire for the pleasure of action, but the presence of a distinctly antagonistic force, the tendency to recoil from or avoid what is disagreeable. A sluggish or indolent child shrinks from performing an action which is suggested to him by some wish, or by the words of another, just because he represents it as accompanied by the disagreeable feeling of effort.

The outcome of this process of arrest will depend here, as in all other cases, on the relative strength of the opposing tendencies. If the dislike to exertion is stronger than the desire for the pleasure, this last will be frustrated. Now, as we saw above, the intensity of desire or impulse towards action is determined in part by the degree of readiness to act at the time. Hence, when there is great indolence, the desires are likely to be enfeebled. As a consequence of this there will be no violent opposition and checking of an impulsive force. Thus children of a sluggish temperament rarely experience this kind of antagonism in its full strength. Desire only reaches a rudimentary or nascent stage.

Let us now take the other case of recoil from action, that in which an action to which the mind is impelled by a positive desire for a pleasure is seen to lead to another and painful result. For example, a child confined by a cold looks out of the window and sees his brother at play. He feels impelled to go out and join him, but fears the rebuke of his mother, or perhaps the natural effect of the rash action. In this case, too, the impulse will be thwarted, partially or completely. Since the mind shrinks from or seeks to shun pain, the recognition of a painful consequence to an action has as its immediate result a recoil, or movement of the mind away from the action, just as though the action were itself represented as disagreeable.

Here again the effect of the prevision of evil in repressing impulse will vary according to a number of circumstances, such as the relative strength of the attractive and deterrent forces, and the strength of the disposition to do something at the time. And here, too, we see marked differences of effect according as the temperament is wary or cautious, or on the other hand impulsive and impatient of delay.

Rivalry of Impulses. In the third place, the arrest of action may be connected with the play of a plurality of active impulses By this is meant that the mind is at the same time excited by distinct desires, that is desires for different pleasurable objects, and so is drawn in different directions or towards different lines of action. For example, a girl is sitting reading a story. Her brother comes and asks her to join him in a walk. She has a desire both to accede to his request, and to go on reading her story. In this case each impulse checks the action of the other according to the degree of its strength or energy.

The essential element in this state of rivalry of desires or impulses is the simultaneous prompting of desires towards different lines of action. The situation takes on a slightly different aspect in different cases. In some instances the opposition seems to arise rather through the limitations of action and of the means at our command (*e.g.*, inability to be in two places at one time, to do two things at the same time, to employ a given sum of money in procuring different objects, &c.). In other cases the opposition seems rather to spring out of the incompatibility of the objects desired (*e.g.*, a state of great bodily vigour and high scholarly attainment).

It is to be added that the two cases here distinguished as recoil of desire and rivalry of impulses are not perfectly distinct from one another. As we saw above, desire and aversion are closely related one to another, and pass one into the other. Thus in the instance of recoil of desire given above the boy's fear of giving offence to the mother would easily become the positive desire to retain her favour, in which case the situation would become distinctly one of rivalry of impulses. On the other hand, when there is rivalry of desires the impulse towards each action tends to transform itself into an aversion to the alternative action, and so operates as a deterrent on the other desire.

Different Forms of Rivalry. This rivalry of impulses or desires may take different forms. Two actual feelings may prompt in different directions. Thus a child comes in tired and hot from a walk. He desires to rest, and at the same time to go and quench his thirst. Or two represented feelings or particular ends may collide, as in the case cited in the preceding paragraph. Or, again, two permanent ends may collide, as in the common case of the opposition between an arduous pursuit of study and a regard for health. Finally an impulse of one order may collide with one of another order below or above it. Thus a represented feeling may oppose itself to an actual one, as in the common antagonism between the pleasure of indolence and a desire to make an exertion for some purpose. Or a permanent end may oppose itself to a lower impulse. The collisions between appetite and a prudent regard for health, between the impulses of play and the motives of study, are familiar examples of this opposition.

Strife of Desires and its Passive Resolution. When the mind is thus at the same time drawn towards and repelled from an action, or drawn towards two different lines of action, there arises a postponement of action and a process of alternate inclination in this and that direction. To revert to our illustration. The girl pictures the pleasures of the walk: images of the shady lanes, their banks sown with primroses, the sound of birds, and so on, succeed one another. While these are before the mind there is a nascent impulse to comply with the brother's suggestion. But before this impulse has time to work itself out the other series of images, remaining in the cool of the house, and perusing the pleasant story, arise and excite a desire towards the alternative course. This successive excitation of desire which is instantly opposed by another force, gives rise to a painful sense of conflict.

This process tends to terminate of itself. One of the impulses often proves stronger and more persistent than the other, and so succeeds in expelling it altogether, and having its way. Or the pain of the state of conflict itself is so great as to hasten a result one way or another. The mind follows out one of the opposing impulses rather than go on enduring the conflict. A strong tendency to act somehow at the time greatly expedites this passive resolution of the conflict. Children with strong active impulses and weak power of representing consequences are incapable of such a prolonged process of alternate representation and desire.

This purely passive process of resolution answers in certain respects to the effect of a number of mechanical forces acting on one and the same body. Just as the body tends to follow the direction of the stronger force, so action tends to follow the direction of the stronger desire. And just as two opposed forces when equal may counteract one another producing a state of equilibrium and rest, so two opposing desires may just counteract one another and so produce as their conjoint result not action but inaction. But this rarely happens with the young and those strongly disposed to activity. The tendency to act somehow, which is greatly enforced by the growing aversion to the pain of conflict, operates as a powerful factor on the side of some action.[1] Which action is finally carried out, is in cases of approximately equal stimuli very much a matter of accident, depending on which of the impulses happens to be in the ascendant or most distinctly present at the moment when the desire to act somehow, and the aversion to the pain of conflict reach a certain strength.

Regulated Conflict: Deliberation. Thus far we have supposed the process of inhibition of action and conflict of impulse, as well as its resolution, to be a comparatively passive one in which the several contending impulses are left uncontrolled to determine the result according to their relative degrees of strength. And this supposition corresponds roughly at least with many of our complex actions, and more particularly those of early life when the will-power is low.

But the development of the will implies a transformation of this comparatively passive process into an active one, in which a new element enters, that which we customarily mark off as an *effort of will* in arresting and controlling impulse. Owing to the presence of this new factor, the process of contention becomes regulated and takes on the form of an effort not to follow out an impulse, and a resulting process of deliberation. The will exerts itself in a new and more difficult form, in striving *not to act* but to postpone action, so as to allow time for the several conflicting considerations to come up.

[1] The pain of conflict in such a case, being proportionate to the intensity and persistence of the desires, will in general be greatest in the case of those having a strongly marked active temperament.

This form of will-exertion, striving not to act at the moment, is a peculiarly difficult one. To begin with, it presupposes the presence of a new and highly representative motive, namely, the apprehension of, and aversion to, the evils of rash or impulsive action. This motive is a slow growth presupposing many experiences, careful attention to the less obvious and immediate results of action and even processes of comparison and abstraction. And while the motive to such voluntary inhibition of impulse is thus difficult of attainment, the act of inhibiting is itself beset with peculiar difficulty. To strive not to act when impulse prompts implies a considerable power of attention, an ability to keep a representation steadily before the mind when it tends to be overpowered by impulse. This again involves the strengthening of the higher brain centres, more particularly, perhaps, those motor centres which seem to be specially concerned in volitional attention. Hence the special difficulty of such exertion in the case of the young, who, moreover, as we have seen, are characterised by a powerful bent to action.

The will having thus exerted itself in checking action, proceeds to supervise the process of alternation and collision of impulse. That is to say, the attention is voluntarily directed to the several objects desired so as to keep them all before the mind long enough to estimate precisely the full value of each in itself, and to compare these values one with another. Thus if it be simply a question of doing or not doing a particular thing, the mind carefully counts up the advantages and disadvantages and sets the one against the other. Or if it be a case of two rival ends, it compares one object of desire with another, so as to determine their relative magnitude or value. This is known as deliberation.

In addition to this deliberation respecting ends, there is a deliberation respecting means. Here the co-operation of intellect in volition becomes much more distinct. The estimation of this and that end, though involving comparison and discrimination, is ultimately a matter for feeling and desire. The process of deliberation simply allows of the fullest development of the individual's desires. In the case of deliberating about means, however, the estimation is wholly a matter of (practical) knowledge and judgment. In order to know which action will best contribute to a desired result, we have to recall the different degrees of perfection in which the actions have usually brought this about, and also the various degrees of probability of the several means being effective. This presupposes a considerable development of the intellectual powers.

Choice or Decision. As the final stage of this regulated process of conflict we have an act of choice or decision. After duly weighing the pleasure and pain, the good and evil, resulting from any action the one is seen to preponderate over the other. Then the mind knowingly chooses or decides to act or not to act. Thus, to return to our illustration, the child finding that the probable evil of running out into the garden is greater than the good, abandons the wish, and decides not to act. This involves a dismissal of the alluring image from the mind. Similarly in the case of rival ends. Thus, to revert to our other example, the girl finding that on the whole the pleasure of remaining at home is greater than that of taking a walk decides on the former course, deliberately selecting it as the better. In like manner the mind chooses between different means, deciding which course of action is best fitted to bring about a desired end.

It is to be added that the resulting decision is rarely of the perfect form here described. The force of activity or the tendency to do something, aided by an impulse to escape from the painful state of conflict, frequently helps to resolve the point, both in choosing ends and choosing means, in a comparatively passive way. This is particularly true of the decisions of early life.

It is plain from the above account of choice that it is related to discrimination. It may indeed be said to be in the region of action what discrimination is in that of intellection. And just as we recognised an implicit discrimination, in which only one term is present to the mind at the time, and an explicit in which both terms are present, being distinctly compared one with another, so we may distinguish between an implicit and an explicit choice. Thus there is a rudiment of choice in an animal's selection of nutritious substances.[1] On the other hand, explicit choice involving comparison (of ends or means) belongs to the higher stages of will-development.

Calmness and Strength of Will. The ability to check impulse or postpone action, and to deliberate and choose, is the characteristic of a calm enlightened and regulated will. Its development is a slow process and only commences in early life. The young child cannot defer acting. In cases of conflict the pressure

[1] This is the way in which Mr. Romanes has employed the term choice, making it co-extensive with conscious action (*Mental Evolution in Animals*, Chap. I.).

of impulses, assisted by the pain of the state of conflict itself, is too much for him, and he is unable to master the rival forces and reduce them to order. He wants too the *intelligence* for comparing and deciding.

The most important ingredient in the natural basis of this higher power of will is a certain retentiveness for feelings, more especially painful experiences. As observed above, children have not an equally good memory for the pleasurable and painful. And a strong tendency to action favours the dwelling on the attractions to, rather than the deterrents from an action. Children very early show differences in this respect, as in varying degrees of rashness, cautiousness or circumspection of temper. Along with this element of cautiousness there must go a certain strength of the practical intelligence. A good chooser must not only be able to master impulse, he must be able to weigh and compare. We thus see that vigorous activity is not the only condition of a strong will. *Disciplined* strength depends on a combination of active vigour, strength of desire and impulse, on the one side, and of cautiousness on the other. Its natural foundation lies between the extremes of over-activity leading to rashness, and of over-cautiousness leading to inaction.

Resolution: Perseverance. One other common accompaniment of this higher and more reflective type of action remains to be touched on, namely, resolution. By this is meant the formation of a distinct determination to perform an action which is seen to lead to a desired end. It is something more than deciding on an end, and an appropriate action, as good.

Such decision often passes instantly into action, in which case the stage of resolution is not fully developed. Thus resolution has reference to an action not capable of being carried out at the instant. For example, a child breaks something: decides that it is best to tell his mother: and finally resolves to do so when he next sees her. Resolution is thus the internal equivalent of a complete voluntary action (and so differs from a mere desire to act), though the completed mental process is debarred by the circumstances of the moment from issuing in the final stage, the external action. It involves a distinct belief in the future occurrence of certain circumstances, and a preliminary volitional activity in the shape of expectant attention and a preparedness to act in a definite way when the moment arrives. Being thus the most fully developed form of the psychical process of willing, resolution is commonly taken as the type of all volition. To will is pre-eminently to resolve to do a thing.

It is plain from this brief account of resolution that it enters as an ingredient into all prolonged actions and chains of actions. For in every such case it is not enough to will each action at the moment of its performance, all stages of the action must from the first be resolved on.

There is a germ of resolution in ordinary actions, since they commonly involve a prolonged series of movements. Thus, to revert to our simple case, the child that decides to go out and play must, it is plain, maintain this decision for a time long enough to carry it into practice. It is, however, in those more lengthy actions or chains of action which involve distant results that the stage of resolution comes distinctly into view. In all serious undertakings, as in learning to swim, in working for a prize, the mind has to go on directing itself to one end, and, in subordination to this, resolving to carry out a prolonged succession of active steps.

Here power of will is manifested in strength and pertinacity of resolve. A child with a robust will perseveres in spite of difficulties, does not relax effort because of a delay in success. He will not allow himself to be turned aside by other objects, or by the example and persuasion of others. This quality of firmness in resolution involves the power of keeping steadily before the mind a definite result, and shutting out all considerations which would cause the will to deflect from this particular direction. It thus implies a certain continuity of interest, and persistence of the attention in a particular direction. It is in the sphere of action what concentration is in the sphere of knowledge.

While we have considered resolution on its positive side only (as resolution to do), we may see at once that the same process is involved in its negative side (resolution not to do). To resolve not to do a thing involves the anticipation of a certain situation, the prompting to a certain action, and the preparedness of mind to curb the impulse. Resolution, though conceived here to follow a process of choice, frequently appears without any explicit comparison of different actions. Its sufficient conditions are a desire suggesting a certain action which is recognised as realisable in the future. Since resolution implies the representation of future circumstances, it persists only so long as the anticipation of these recurs. Hence many resolutions are temporary only. Again, since resolutions are arrived at in the absence of the appropriate circumstances, they are, even when strong and persistent, no guarantee for actual performance. Their future efficiency depends on the adequate representation of *all* the circumstances. This accounts for the ignominious collapse of so many brave resolutions when brought face to face with actual circumstances. Finally, it is to be observed that increase in the power of foreseeing action tends to widen the area of resolution. Thus so far as our daily actions become ordered according to a plan, they all have a stage of resolution as their antecedent. We habitually look forward to the succession of actions making up the business, &c., of the day, and resolve to perform them in due order as circumstances occur. And the subordination of action to ruling ends implies, as hinted above, a habitual state of resolution, that is preparedness to act in certain ways in certain circumstances.

Firmness of Will. This quality of resoluteness is one of high moral value. It is one of the special characteristics of a firm or stable will. It is to some extent distinct from the power of choosing and coming to a decision, for many persons who find great difficulty in choosing are strong and unmoved when they have once made a choice. The excess of this quality is obstinacy which will not face the fact of the fruitlessness of effort, which refuses to profit by new experience, and to learn from the advice of others. Children through their inability to represent steadily the remote future are commonly deficient in that firmness of will which is required for attaining a distant result. On the other hand, their strong impulses to action, and their disinclination to defer doing things and to consider, lead them to resist the efforts of others to guide and persuade them. This gives to them that appearance of obstinacy (self-will) which we are apt to regard as a characteristic of childhood. But there are well-marked individual differences among children in this respect.

Self-control. (A) Control of Action. The term self-control points to the ability of the developed will to overcome and keep within due limits special forces or tendencies viewed as opposed to it at the time. It thus consists in the main of what has here been called inhibition. All inhibition is however not control. In order that it be dignified with that name it must be of the active kind (involving an effort not to do something or to suppress an impulse), bringing into exercise the highest form of will-activity in the shape of voluntary attention, and further include the subordination of a comparatively presentative impulse to a representative or rational motive. The term has thus a reference to the order of development. Control is subordination of the earlier to the later. It is something not natural to the child, but difficult and involving effort. The term has too a slightly ethical significance, and implies, in most cases at least, the sway of the higher and worthier motive over the lower and less worthy.[1]

The first variety of self-control is the control of action or active impulse. By this is meant in the first place, and principally, the restraining of any kind of tendency to movement growing out of a simple or early form of impulse. Thus it includes the ability to inhibit not only impulses to act for the sake of immediate gratification, but tendencies to movement springing out of restlessness or desire to act, and also the dispositions (whether congenital or due to habit) to move in response to certain sensory stimuli, and to conjoin movements in certain ways.

Although the control of action consists mainly of this negative mode of activity, the inhibiting of im-

[1] The repression of a generous impulse by calling in prudential considerations would illustrate a psychological process of self-control, though hardly an ethical.

pulse to movement, it includes as a subordinate feature a positive mode of activity. This is the ability and readiness to exert activity and perform actions when these are in themselves or their immediate consequences disagreeable. The full control or command of the active organs implies the ability to bring them into activity when the actual circumstances of the moment deter from action.[1]

Stages of Self-control. It follows from our brief account of the development of the will that there is a gradual progress in self-control. The simplest form is seen when an actual feeling is checked and overpowered by the mere anticipation of a feeling. Thus when a child overcomes his indolence and sets about preparing his lesson in order to avoid punishment he is exercising the power of self-control. Again when a present or immediate gratification is postponed to a future one, as when a child puts by his sweetmeats in order to enjoy them to-morrow, he exercises self-control.

A much higher stage of control is reached when intelligence is developed and the child apprehends enduring ends, or interests, such as health, reputation, and knowledge. The subordination of particular and temporary ends to these general and permanent interests is an exercise of control. Thus the child reaches a higher form of control when he sets the maintenance of his health before him as an enduring end, and represses all desires inconsistent with this. In this way he practises the virtue of temperance.

The highest stage of this self-control, in so far as it

[1] The term 'command,' though used in much the same sense as 'control,' seems to point more distinctly to this positive aspect.

has to do with personal good, is the exercise of prudence. By this is meant that the several aims and interests of life are so adjusted as to yield the greatest sum of happiness to the individual. This implies the subordination of each of the enduring interests, health, knowledge, &c., to a still higher and more comprehensive principle of action. And such subordination involves an effort to restrain a lower force by means of a higher.

Finally, the individual good is subordinated in a measure to the common good. The general good or happiness, including that of ourselves and of others, is a wider principle of action than personal good, and easily conflicts with it. Children naturally desire their own happiness, and are but little concerned about the good of others. To restrain selfish promptings, to consider what others like and expect, involves an effort of self-control of a peculiarly difficult kind. The pursuit of 'common' interests, as knowledge and art, since they lift the individual above the thought of personal good, and attach him to an object of common pursuit, may be said to limit in a manner the egoistic promptings. But the motives which most effectively oppose and check the personal aims and desires are those of duty, benevolence, and generally what we call humanity. It is in the collisions of interest and duty, of egoistic and 'altruistic' prompting, that the highest attainments in the art of self-control are reached.

The exact relation of the motive of benevolence which underlies the pursuit of others' happiness to the motives prompting to individual or personal good, is a matter of great psychological difficulty. It has been already pointed out that in aiming at relieving another's pain, or at increasing his pleasure, we in a manner substitute his welfare for our own. The peculiarity of this type of action is recognised clearly enough in the everyday distinction between selfish and unselfish or disinterested conduct, a distinction which has been the subject of much ethical discussion. Although a sympathetic person himself derives pleasure from ministering to another's pleasure, this does not seem to be the object distinctly represented in a benevolent action. Hence this mode of action has been withdrawn by some from the class of volitional actions proper. Thus Dr. Bain regards it as analogous to the group of ideo-motor actions or those actions due to the force of persistent ideas *(idées fixes)*. (See *The Emotions and the Will*, Pt. I., Chap. VI., § 12.)[1]

These operations of self-control when intelligently performed may assume the form of acts of obedience to a self-imposed command. The agent applies to himself the rule or maxim 'Be temperate,' 'Be truthful,' and so forth. In this way the child from simply obeying an external authority and following external counsel learns to obey the inward voice, and to follow the persuasions of reason.

(B) **Control of Feelings.** The growth of will thus manifests itself in checking and overpowering impulse or lower motive, and generally in curbing and governing movement. But this is not the only form of self-control. The will is called on to restrain and regulate other forces lying outside the region of action proper.

Of these extraneous forces the first and most obvious is feeling, emotion or passion. Feeling as we have seen discharges itself in movement. The control of feeling is thus analogous in certain respects to that of impulse. The first thing a child has to do in

[1] On the nature of benevolent or disinterested action consult further Mr. Sidgwick's *Methods of Ethics*, Book I., Chap. IV., § 3; and Mr. Stephen's *Science of Ethics*, Chap. VI.

checking the force of passion (anger, grief, &c.) is to inhibit the external actions, such as crying, and throwing the arms about. Here some effect is produced in the motor centres as in the case of restraining impulsive action. Since, moreover, feeling and its bodily expression are closely connected one with another it follows that this arrest of external action will tend to some extent to allay the feeling itself. By making an effort to repress the signs of grief, the grief seems to lessen.

What the exact effect of this restraint of external movements will be in any given case depends partly on the strength of the feeling. If an emotion say of anger is very intense, the suppression of its external signs may do little to stifle the feeling itself. The mind may cherish the passion internally brooding on ideas of satisfaction. The result of such external self-restraint will vary too with the temperament of the individual. When this is favourable to tenacity of feeling, it may smoulder on and have sway over the mind even when its outer expression has been checked.[1] Hence the need of some additional means of restraining feeling. This will be spoken of presently.

The control of feeling is a more difficult attainment than that of active impulse. Children's feelings are violent and all-subduing at the time, and the will is

[1] The failure of the inhibition of its external movement to repress a feeling depends on the fact that the muscular actions though adding something to the feeling serve as a channel of relief or escape for the pressure of emotion. This effect of relief appears to be more marked in the case of quick-tempered persons. (See Dr. Carpenter, *Mental Physiology*, Book I., Chap. VII., § 265, *cf.* § 270.)

sometimes called on to stay a torrent. The first efforts at self-restraint only begin when the power of controlling active impulse has been exercised up to a certain point. This gives the necessary ability to inhibit movement. To this we must add the circumstance that the motives to the control of feeling are late in their development. Children are proverbially frank in manifesting feeling. It requires considerable experience and knowledge of the ill effects of unrestrained passion on the child's wellbeing, as well as a certain measure of regard for others, to practise this form of self-control.

Here, again, it is to be noted that volitional control, though mainly a negative process of inhibition, includes a positive element. The command of the feelings by the will implies the ability and disposition to assist in calling up desirable emotions. This is illustrated in the art of good manners, which involves the deliberate cultivation of kindly feeling, and still more distinctly in all self-appointed exercises for promoting moral and religious feeling.

(c) **Control of the Thoughts.** A second group of forces against which the will has in a manner to work in order to subordinate them to its own ends, are those of intellect. By these are meant the tendency of all presentations or representations when they occur to attract the attention, together with the tendency of these when present in the mind to suggest or call up other images or thoughts in any way associated with them. The inhibitory action of the will in counteracting these forces is, as was pointed out above, immediately connected with a positive action, namely, the fixing and detaining of certain presentations or representations before the mind so as to secure their greatest measure of distinctness, and the aiding in the calling up of representations of which the mind is at the time in need.

As we have seen, intellectual growth and discipline imply at every stage the control of these forces or tendencies by the will. At the very beginning of knowledge, the mind is exercised in giving fixed attention to a particular external object, to the disregard of other and distracting sense-solicitations. Observation means the ability to keep the attention concentrated on an object for a time, and to resist the natural tendency of the mind to flit from this to that object. Again, in learning or committing something to memory, the will is called into play in the form of concentration on the subject of study. And in order to keep his mind steadily fixed on his lesson the child must have a certain power both of shutting out external impressions, and of excluding any associations with the words or facts he is committing to memory which happen to be foreign to the matter in hand. And this power of controlling the forces of suggestion is seen in 'trying to remember' something. Finally in the higher processes of constructive imagination, of abstraction and reasoning, this power of turning the attention away from what is interesting and of resisting the forces of suggestion, is called into exercise in a much higher form. All calm and regulated thinking implies not only the power of turning away from external objects, of 'abstraction' in the popular sense, but also the command of the intellectual trains themselves, the capability of interfering with the natural flow or succession of the images or ideas, selecting those which are suitable and retaining them before the mind, and excluding those which are unsuitable.

Connection between Control of Thought, Feeling, and Impulse. While we have thus distinguished between these three forms of control, we may easily see that they are closely related one to another. For, in the first place, feeling, thought, and action are to a certain extent opposed or mutually exclusive states of mind; and this being so, it follows that the positive furtherance of any one by the command of the will involves the inhibition of the opposing force. A word or two will suffice, after what has already been said, to make this clear.

To begin with the effects of feeling, since strong or violent emotion of all kinds agitates the mind, disarranging the mechanism of attention, and substituting an emotional order for a logical order in the flow of the thoughts, it follows that the perfect command of the intellectual processes presupposes the capability of controlling feeling. And since, in addition to these effects, emotion takes possession of the muscular system, it is plain that the inhibition of feeling is involved in the full command of the movements. Once more, since external action and internal thought are opposed states of mind, the perfect command of the intellectual processes will include the inhibition of movement. As was pointed out above, the very attitude of attention, even when directed externally to objects of sense, is one of bodily stillness or cessation of movement. And the internal direction of the attention to the thoughts of the mind illustrates this inhibition of movement in intellectual activity still more plainly.[1]

We may now look at the relation between the control of the thoughts, of the feelings, and of the actions, as determined, not by the opposition, but by the connection between these mental states. And here we have to do with two cases, namely, the dependence of feeling on intellection, and of action on intellection and feeling.

(1) As has been observed, all emotion is excited in connection with intellectual activity of some kind. The presence of a feeling in the mind depends on an intellectual process. Thus, the child's vexation only lasts so long as he sees or thinks about the source of his disappointment. Hence the importance of controlling the thoughts as a means of controlling the feelings. As was pointed out just now, we can only very imperfectly control feeling by repressing the accompanying external movements. The only efficient way of reaching feeling is by mastering the intellectual processes concerned, by turning the mind by an effort of will from the exciting cause of the feeling, and directing it on something wholly foreign and unconnected. A child's feeling of disappointment

[1] It is remarked by Dr. Ferrier that the internal diffusion of nerve-energy involved in thought, and the external diffusion of it in muscular action, vary in an inverse ratio. Consequently, "in the deepest attention, every movement which would diminish internal diffusion is likewise inhibited. Hence, in deep thought even automatic actions are inhibited, and a man who becomes deep in thought while he walks may be observed to stand still" (*The Functions of the Brain*, Chap. XII., Sect. 103).

when not very intense is got rid of without an effort of will, merely by a diversion of the attention to some new object with its connected train of images. But when more deep and persistent it can only be completely dominated by an exertion of his own will in resolutely turning the attention to something wholly unconnected with the feeling.

(2) Again, feeling and thought are involved in action. An emotion either actually excited, or at least called up in a representative form, is the impulse to action. In order then to control impulse, feeling must be controlled, and along with this, the thoughts in so far as they are conditions of the feeling. The impulse to do an unkind action is only completely repressed, when the feeling of anger out of which it springs is repressed, and the remembrance of the injury which excites the feeling banished from the mind. Hence the importance assigned in the best ethical systems to the control of the desires and thoughts 'of the heart'. The process of deliberation plainly implies a considerable ability in controlling the thoughts and along with these the feelings depending on them. In order to postpone action and to consider calmly the advantages and disadvantages of a course, the will must have the attention well under command.

In illustrating the mutual dependence of the control of action, feeling, and thought, we have confined our attention for the most part to the negative or inhibitory side of control. But it is obvious that there is also a relation between these forms of control on their positive side. That is to say, in so far as the processes of thought, feeling, and action are connected, the promotion of the one by an exercise of the will must involve the command of the others. Thus since feeling involves representation, the voluntary cultivation of feeling, *e.g.*, the æsthetic or religious emotion, depends largely on deliberately fixing the thoughts on the appropriate objects and ideas. Conversely an exertion of will in furthering intellectual activity (concentration of mind) may be aided by voluntarily directing the thoughts to the value or desirability of knowledge and so aiding in the excitation of a feeling and motive. Similarly a feeling may to some extent be voluntarily promoted by taking on the outward expression. Finally, sustained muscular exertion depends largely on a fixing of the attention, or a steady concentration of mind on the object or idea fitted to excite feeling and desire.

Limits of Control. All voluntary self-control has its limits. There is a strength of impulse which no motive force can overcome. No threat would hold back a man parched with thirst if water were placed near his lips. So too there is a force of passion against which the will is powerless. And the most potent suggestions or tendencies of thought ('inseparable associations,' 'necessary beliefs') cannot be controlled by the will. The strength of any person's will in control is measured most obviously by the amount of force overcome. In the second place the degree of strength displayed is estimated in relation to the effort put forth. On the one hand, a powerful will is one which can make a great and prolonged effort. On the other hand, strength of will is displayed in the absence of effort. It implies the ability to effect much at a small cost of effort. This last consideration refers to the effect of repetition and habit in facilitating the processes of control.

It is here assumed that the force to be overcome by the will in the cases compared is the same; but this cannot always be counted on. Thus two men may have equal power of will, but if the passions of the one are much stronger than those of the other, there will be a less perfect command of feeling in the former case. A good stoic is commonly (if not always) not merely a man of a certain strength of will, but a man of relatively weak passions. This answers to the pathological fact that the loss of self-control may arise either through the increase of the force to be mastered, or the impairment of the volitional power of resisting and overcoming.[1]

Physiology of Self-control. All self-control appears to imply the activity of certain higher brain-centres, more particularly the motor centres concerned in voluntary attention. These centres are the highest in the sense that they are the ones chiefly engaged in all the more difficult actions involving special degrees of attention, and also in the sense that they are the latest to be developed. With this fact corresponds another, namely, that as answering to the weakest degree of organisation they are the least stable, that is, the most easily disturbed. This is seen in the loss of the power of self-control which marks the weakening of brain power by over-work, the excessive use of stimulants, as alcohol, opium, and still more plainly the oncomings of mental disease.[2]

It is a disputed point whether the physiological processes are the same in all cases of self-control. In the control of movement and of feeling nervous influence appears to pass from the higher motor centres (including those of attention) to the lower motor centres, from which the process of innervation concerned in the impulsive or emotional movement sets out. But whether these conditions hold good also in the case of the control of *thought* is disputed. According to Prof. Bain this is so. In controlling the thoughts the nervous process is still some influence acting on the motor organs. Since according to him all ideas involve a muscular element, what the will does in controlling the flow of ideas is to act downwards on the motor structures concerned. On the other hand Wundt holds (as we have seen) that nervous influence may pass from the higher motor centres directly to the *sensory* centres concerned in representation.[3]

Habit and Conduct. The principle of habit, the application of which to the lower region of volition,

[1] This is well shown by M. Ribot in respect both of the loss of control over impulse, and of the impairment of the control of the attention and the flow of images, *Les Maladies de la Volonté*, Chaps. II. and III.

[2] On this impairment of the power of self-control under the action of stimulants, and in mental disease, &c., see Dr. Carpenter, *Mental Physiology*, Book II., Chaps. XVII. and XVIII. M. Ribot well brings out how in mental disease the loss of self-control shows itself both in an impairment of the power of inhibition (excess of impulse) and also in that of the power of exciting activity (defect of impulse), *Les Maladies de la Volonté*, Chaps. I. and II.

[3] For an account of Bain's theory see *The Emotions and Will*: 'The Will,' Chap. IV., § 7, p. 370; *cf.*, Ferrier, *The Functions of the Brain*, § 103.

external movement, we have already studied, reigns in the higher region of conduct as well. The processes of deliberation and control just described come under the dominion of habit. This is seen in our everyday way of speaking about them. We talk of a habit of reflection or deliberation, and of a habit of self-control.

Deliberation made Habitual. The fundamental fact emphasised by the word habit is that any kind of action becomes more perfect by repetition. Practice makes perfect. Just as bodily movements at first tentative, unsteady, and involving effort, come by repetition to be certain, steady, and easy, so the arrest of impulse and deliberation grow in precision, steadiness, and facility.

At first the child when his action is arrested by an apprehension of evil consequences vacillates, is the subject of contending impulses, and knows not what to do. But after he has once made an effort to end this miserable state of conflict, and decided to act according to reason, he has taken an important step in moral development. The next time a collision occurs reflection and decision will be easier. The vehement forces of impulse have been reined in to some extent. Every new exercise of the power makes the pause, the consideration, the final calm decision a less arduous process. Finally a habit of deliberation is formed. The promptings of impulse and of the lower motives are now checked without appreciable effort. The temporary postponement of action, and the performance of the preliminary steps of deliberation and rational choice, have become in a manner natural.

Rash action has now grown impossible. The perfect development of this habit would give us the ancient ideal of a 'free' man, whom reason and reflection have set free from the promptings of appetite and sense.

Moral Habitudes. But the principle of habit produces other effects in this region of conduct. The final decision after deliberation, if a rational and good one, does not need to be arrived at again and again. The exercise of self-control in the first case as the outcome of a process of reflection will become in succeeding cases the exercise of control without such reflection. Thus a child who has begun by reflecting whether he shall indulge in a forbidden enjoyment, say staying away from school, or reading a story in class, and decided not to do so, will be disposed afterwards to turn away from this particular temptation at once.

This shows that the process of self-control is becoming habitual in a new sense. Certain motives are acquiring a fixed place in the mind as ruling forces, while other and lower forces are losing ground. Every repetition of this kind of action (that is of action having this motive or reason) tends to fix conduct in this particular direction. The feeling (*e.g.*, affection, sentiment of honour) is now not only developed as a feeling, but passes into the form of a fixed inclination or active disposition (*e.g.*, to be obedient and helpful, to avoid what is mean). Or to express the result another way, we may say that conduct is brought more fully under the sway of a general rule or maxim.[1] This result is what is known as moral habitude.[2] The more frequently this subordination of impulse to a higher motive has been carried out the more easy and quasi-mechanical does it become. The impulse has no time to make its force felt, the dominant motive, as pride, or sense of duty, being followed out uniformly and promptly. The control of impulse has grown perfect through the supremacy of the higher motives, the wakefulness and alertness of which are an effectual bar to the intrusion of lower desires.

It is obvious from this brief account of moral habitudes that they illustrate the dependence of all habit on strength or firmness of association. Thus a habit of veracity involving the confirmed disposition to speak the truth implies, further, that this particular motive or tendency is instantly called up by the circumstances (namely, having something to tell another). The perfection of the moral habitude depends on this instant excitation of the higher motive before the lower impulse which would impede its realisation has time to assert itself.

Definition of Character. The word character is used in everyday language to mark off any sort of difference in mental or moral qualities. We speak of intellectual peculiarities, special tastes, and so on, as entering into a man's character. There seems, however, in all cases to be a special reference to qualities belonging to the *active* side of the mind. Willing or conduct being the final outcome and all-important result of mind as a whole, the word character has come to connote in a special manner active qualities,

[1] On the way in which the dominant motives become developed into conscious principles or maxims of conduct, see some good remarks of Waitz, *Lehrbuch der Psychologie*, § 56, pp. 646 and following.

[2] This term seems best to answer to the ἕξις of Aristotle, which exactly expresses this effect of action in developing fixed inclinations.

as ruling inclinations and degree of volitional energy, and emotional and intellectual peculiarities only so far as they are related to these.

Every individual has his own character. This is fixed partly by his innate constitution or 'nature,' psychical and physical. Such a quality as obstinacy for example commonly shows itself very early in life and is no doubt connected with the innate peculiarities of the individual. In addition to this, every difference in external surroundings, family life, school discipline, profession, &c., serves to modify the character by developing certain special traits. In this way innate differences are partly accentuated, partly repressed and disguised.

Moral Character. In addition to this everyday meaning the word character has acquired an ethical significance. It refers not to the *variable* peculiarities (original and acquired) of individuals, but to certain *common* moral qualities which it is the business of social discipline and education to cultivate in all alike. In other words 'character' has come to stand for 'good character'. And a good character means a moral and virtuous condition of mind, such a disposition of the will, and, in connection with this, of the feelings and thoughts, as will subserve the ends of morality. We thus see that every good or moral man possesses a character in a double sense. He has certain peculiarities of feeling and motive, &c., which give his mind its special colour. This is his individual character. Along with this he possesses certain virtuous tendencies which make up his moral character and assimilate him to other moral men. This moral character is largely acquired, being the product of circumstances and education supplemented by individual reflection.[1]

Moral Character as Sum of Habitudes. Confining ourselves now to the common type of moral character, we see at once that this consists in the possession of certain acquired tendencies or habitudes which we call virtues, both private ones as temperance and prudence, and public ones, as veracity, justice, and benevolence. The excellence of the character can be estimated by the strength of these dominant dispositions. As we have seen, in all comparatively simple and recurring situations where a lower impulse is opposed to a higher motive, the moral habitude shows itself in the completeness of the control and the promptness of the right or good action. The less the susceptibility of the mind to a lower and less worthy motive, the better the character. A perfectly temperate man hardly feels the temptation to excess. The perfectly truthful man cannot entertain the proposal to say what is false. The height of moral character attained in any case is thus determined by the strength and fixity of the virtuous dispositions, their degree of ascendancy over passion, and foolish or wrong im-

[1] This distinction between variable or individual, and moral character must not be pressed too far. There are different types of moral character, and so individual differences find a certain place in the region of moral character. The various definitions of character, from those of the Stoics downwards, accentuate the fact or feature of fixity of motive or consistency in action (*e.g.*, the Stoical definition, "semper idem velle atque idem nolle"). According to Volkmann character consists in this, that every volition finds its maxim ready. He distinguishes the ethical from the eudæmonistic character, remarking that in the former the onesidednesses of individual temperament appear much more compensated than in the latter. (*Op. cit.*, § 154.)

pulse. This fixity obviously involves the quality of resoluteness as defined above. A man of character is one who follows what is reasonable, just, and virtuous with persistence.[1]

Place of Deliberation in Character. The circumstances of life do not, however, always allow of this simple exercise of a virtuous disposition. Situations arise in which the prudent course, or the just course, is far from clear. Thus the student may have to ask himself: 'Will it be better for me to lose a prize than run a risk of impairing my health?' We see then that while a moral character implies the supremacy of the higher rational and virtuous motives, and consequently a readiness to act on them at once in all simple cases, it further includes a disposition to deliberate carefully in all the more complicated and doubtful cases. The function of the will which we call deliberating and choosing is thus never outgrown. It is the highest form of activity of the will, which it is ever ready to exert when occasion arises. It follows that the ideal of a good character is a combination of promptitude in following the right when the right is manifest, with wariness and a disposition to reflect and choose rationally and rightly whenever the right course is not at first apparent.

Nature of higher Volition. It is supposed by some that the processes of volition just considered, and included under the head of self-control, are different in kind from the earlier forms of feeling-impelled action. It is in this later stage of development that the will properly so-called first appears on the scene in the shape of a force above desire

[1] On the interesting question how far a good character implies susceptibility to temptation, and sense of effort in doing right, see some valuable remarks by Mr. Leslie Stephen, *Science of Ethics*, Chap. VII., § 3, 'Effort'.

and aversion and working down on the mechanism of the earlier action. This new principle of action is known as free-will or as the self-determining ego.[1] The assumption made in the foregoing analysis of volitional processes is that, on the contrary, the texture of action is the same throughout, and that the later operations differ from the earlier merely in respect of their greater complexity and representativeness. It only remains to make this assumption more explicit and to justify it by a brief inspection of the phenomena which appear in a special manner to support the hypothesis of a will independent of feeling and desire. These are the closely connected phenomena known as effort of will, and deliberative choice.

Effort of Will. As we saw above, every desire involves a tendency to strive, varying with its strength or intensity. The full consciousness of striving, however, arises only when the action to which the desire impels is difficult, when there is some hindrance or obstruction present. In this case, provided the desire is strong enough to sustain itself over against this obstacle, we have the peculiar experience known as effort.

This experience occurs in different forms. The most familiar one is that of muscular effort. This as was pointed out arises when an action to which desire impels us is excessive (relatively to the power of the organ at the moment) and so irksome or disagreeable. The feelings of strain in lifting a heavy weight, in walking when fatigued, and so forth, are examples of muscular effort.[2]

Next to muscular effort we have mental effort, or effort of attention. Here, too, the essential circumstance is the putting forth, under the stimulus of a desire, of an amount of activity which is excessive in relation to the organ, and so involves the disagreeable accompaniment, a feeling of strain. This has a positive and a negative form, turning the mind *to* an object, as in trying to fix and detain a fugitive thought, and turning it *away from* an object, as in trying to banish an alluring image. Since, however, turning the mind away from a thing always means turning it towards something else, it follows that the two modes of mental effort are closely related.[3]

[1] See the distinction drawn between volitional and automatic action by Dr. Carpenter, *Mental Physiology*, Bk. I., Chap. IX., Sect. 1.

[2] It is beside the purpose here to inquire whether the feeling of muscular effort is connected with the outgoing nerve-process, and so a feeling of innervation, or with an incoming process consequent on muscular contraction. Dr. Ferrier affirms that this latter is the case, and that it is more particularly the contraction of the muscles of the chest which gives rise to the feeling of effort. (*The Functions of the Brain*, Chap. IX., p. 223.)

[3] It follows from what was said above, that muscular and mental effort are not wholly distinct. For, on the one hand, close attention implies muscular action, and it is with this that the feeling of strain is in part if not altogether

In these cases the irksome and disagreeable nature of the action tends as a mode of pain to arrest the impulse. The action, however, is sustained by the force of the desire, which (as was pointed out above) must go on increasing as the degree of the difficulty and irksomeness of the action increases. Now when, as often happens, *e.g.*, when a boy is performing a muscular feat in order to win admiration, the stimulus or impetus is strong relatively to the deterring force, there is no distinct representation of the pain before acting, and consequently no shrinking from it. In such a case there is the feeling of effort arising from the action, but not an effort of will in the full sense.

This last occurs when the painful deterring circumstance is distinctly represented and resolutely confronted by the mind. Thus the tired labourer who goes on facing his irksome task experiences an effort of will. Here the consciousness of effort does not arise first of all in connection with the actual doing of a thing, but appears in the preliminary stage of representation. It is in fact an effort of decision and of resolution. It is most strikingly illustrated in moral effort, as when a boy persists in befriending an unpopular boy in spite of ridicule.

In addition to this positive form of effort of will or decision there is a negative one. This is connected not with the persisting in an action in the face of difficulty, but with the drawing back from an alluring object and so checking action. It is illustrated in deliberating before action, and in deciding not to act when impulse prompts.

Effort of will appears, then, to be specially connected with deficiency of motive force. The feeling of effort arises as a concomitant of the calling into activity of some new force distinct from the impulses primarily engaged. In making an effort the will seems to throw in its strength on the weaker side, either encouraging and aiding a weak impulse, or reinforcing a feeble aversion. Thus the effort involved in jumping out of bed on a frosty morning seems to have as its object to neutralise the momentary preponderance of certain agreeable sensations. It compels action to follow the most irksome and disagreeable course, 'the line of greatest resistance'.[1]

The explanation of this apparent exception to the general principle of willing, that action is the result of the desires (and aversions) excited at the moment, is probably as follows. This effort of will, appearing in cases of insufficiency of stimulus at the moment, is due to a preliminary voluntary action in the shape of attention to the representations concerned. This act is best described as a reflective act. It implies a fixing

connected. On the other hand, voluntary action involves attention, and the special difficulty of many muscular actions (new and delicate manual operations, &c.), is largely one of fixing the attention.

[1] This is well shown in Dr. W. James' interesting account of the phenomenon. *The Feeling of Effort* (Boston, 1880), p. 22 *seq.*

or concentrating of the mind either on a representation fitted to rouse action (*e.g.*, of the coveted prize) or on one fitted to excite aversion and so deter action (*e.g.*, of the evils of self-indulgence). In either case it has as its effect the rendering of the representation more distinct, prominent, and persistent, and so the adding to its motive force. Moral effort is thus reducible to mental effort, that is, the sense of strain accompanying an act of voluntary attention carried out under peculiarly difficult circumstances.[1]

It only remains to say that this act of attention is, like other actions, prompted by its proper motive, which may be called the motive of reflection. This motive is a highly complex or representative one, presupposing a wide range of experience, and numerous processes of comparison. It is a negative rather than a positive desire, namely a shrinking from or aversion to the evils or pains incident to hasty action on the one side and hasty abandonment of it on the other. It is a motive presupposing a high degree of intelligence. For it implies that the mind has again and again gone back on its actions and found out by a process of comparison that the momentary prompting may lead to ill results, that the actual present or proximate tends to shut out from view the remote, that the presentative has an unfair advantage in competition with the representative. In 'making an effort' to fix our mind on a distant good or a remote evil we know that we are acting in the direction of our true happiness. Even when the representation of the immediate result is exerting all its force, and the representation of the distant one is faint and indistinct, we are vaguely aware that the strongest desire lies in this direction.[2] And the resolute direction of attention in this quarter has for its object to secure the greatest good by an *adequate* process of representation.

This motive assumes its highest form in deliberation. Here we may be far from sure that the good lies away from the direction of the desire uppermost. But experience has taught us that this is frequently so, and

[1] Though it has been here assumed that effort of will is always in the direction of the morally best, it must be borne in mind that this is not so in every case. A lofty moral motive (*e.g.*, patriotism) may reach the inflammatory stage, possessing the mind to the exclusion of others, in which case the effort of will would tend to the calling up of comparatively unworthy prudential considerations. The dependence of the feeling of strain in effort of will on a difficult act of attention is illustrated by the fact that in cases of moral decline where there is a sense of conflict, and of obstruction of impulse by moral habit, there is no consciousness of mentally straining towards an object.

[2] This knowledge of the motive-value of a representation not fully developed at the moment is clearly analogous to the mind's awareness of the inferiority of the representation to the presentation which, as we saw above, is involved in all desire.

the risk of acting impulsively or hastily is the real deterrent from the action. Here the motive of reflection takes on distinctly the form of a desire for the just and adequate representation of the whole self, that is to say, all the feelings and inclinations of the individual which are related to the case.[1]

Free-Will. The popular notion of a free will is of a will unfettered by humanly imposed restraint or compulsion in any of its forms. Compulsion, *e.g.*, driving the slave to his work, is the most striking case of the application of a motive of such intensity as to overpower all others, and practically to exclude the possibility of competition of motives, and choice. When any potent stimulus acts on the will in such a way as to preclude all possibility of deliberation and choice the result is apt to resemble that of compulsion. Thus a man threatened with instant death by the attack of a burglar would commonly be said to have been compelled to shoot his assailant. The insane are recognised as under the 'compulsion' of their dominant impulses. The idea of freedom is thus closely connected with the possession of the ability and opportunity to reflect and choose.

Upon this popular idea of freedom there has been built up another and distinctly philosophical idea, that in choice-accompanied actions the result is not always determined by the several factors of desire and aversion aroused at the time, but that it may be undetermined. The will is here self-determining and not determined by motives. In deliberating and choosing the mind controls the force of motives, leading action away from the direction of the strongest desire. This doctrine is a philosophical or metaphysical one since it implies a certain theory respecting the nature of the mind or the ego in itself as an active principle, and (in close connection with this) respecting the meaning of Power and Causality. At the same time, it is a psychological theory in so far as it implies and is (in part at least) based on a particular view of the phenomena or facts of willing. And it is under this aspect that it calls for consideration here.[2]

Our inspection of the process known as effort of will enables us to recognise the element of truth in this doctrine. The co-operation of reflection does undoubtedly serve to modify the action of the motives to some extent. It tends to neutralise the monopoly of consciousness by a single impulse. Moreover, since all actions preceded by reflection and

[1] The feeling of effort is well discussed by Prof. James in the work already referred to. He seems, however, to draw an absolute distinction between muscular and moral effort in so far as he supposes in the latter the co-operation of a principle of self-determination. The experience of effort in pathological conditions is dealt with by M. Ribot, *Les Maladies de la Volonté*, p. 64 *seq.*

[2] The doctrine has further an ethical side. It stands in intimate relation with the theory of moral responsibility.

deliberate choice are the outcome of the fully represented, as contrasted with the partially represented self, they are felt to be our own actions in a peculiar manner. There is more of ourselves, less of accident in them than in hasty inconsiderate actions. But while this is clear, it seems no less clear that the resulting actions in these cases are not undetermined. The act of reflection has its own motive, and the energy of this act varies with the strength of the motive, both in different individuals, and in the same individual at different times. And all that the act of reflection can do is to bring to light or develop a latent force of desire. It does not create impulse, it simply aids in calling it forth. In every case the action is the resultant of the factors ultimately engaged.[1]

The doctrine that action may be undetermined or unmotived by desire and aversion (as above defined), though having its strongest apparent support in the higher volitional processes of self-control, is rendered plausible to some extent by the difficulties of recognising all the factors even in cases where 'effort of will' does not co-operate. Sometimes the real motive may escape detection from its very faintness, *e.g.*, in many capricious actions of an easy kind motived by the mere love of displaying individuality, &c. In other cases the forces are largely outside consciousness, effects of habit or fixed tendency to act in particular ways. The sum of these tendencies, making up what we call the fixed character of the individual, represent the result of a process of organisation extending beyond the limits of the individual life into that of his ancestors. To this it may be added that in all our actions there is a variable temporary factor, degree of strength of emotional sensibility and of readiness to act, which serves to give a certain appearance of capriciousness or accidentalness to the result. The same prospects of pleasure affect us very differently as motives according to our degree of emotional susceptibility at the time. All this serves to give an appearance of arbitrariness to voluntary action even when we observe it subjectively, that is in ourselves. And when we consider it objectively, in others, this semblance of indeterminateness is greatly increased. Nevertheless, the true understanding of the processes involved leads to the conclusion that in every case action is determined by the forces (psychical and physical) operating at the time.[2]

[1] As Volkmann well puts it, "the power which reveals itself in the final volition (Endwollen), is no power above the representations, but only a new revelation of the powers working in the representations; and that the final volition gives the advantage to one of the contending volitions (or perhaps suspends both), is explained by the fact that this very volition proves itself ultimately to be the resultant of the collective internal movement" (*Lehrbuch der Psychologie*, Vol. II., p. 456).

[2] For a fuller account of the doctrine of the controversy respecting Free-Will, see J. S. Mill, *Examination of Sir W. Hamilton's Philosophy*, Chap. XXVI.; H. Spencer, *Principles of Psychology*, Part IV., Chap. IX., § 219;

Training of the Will. By the phrase the training of the will we mean the exercising and strengthening of it by the various agencies of command, encouragement, and instruction. This educational influence and control include first of all the supplying of motives to good conduct (deterrents and inducements). The very relation of educator and child allows of this extension of motive force. The parent or teacher holds out the prospect of penalties and rewards, and so alters the direction of action. But the discipline of the will is more than this. It includes the art of guiding the young mind in reflecting on the results of his action, of calling into play as motives feelings which are feeble and fitful, and apt therefore to be stifled in the surging of stronger inclinations. The training of the will thus includes in a measure the exercise of the intellectual powers, and the cultivation of the emotions.

Need of Discipline. The need of authority, of command, or what is more especially meant by discipline, arises as soon as the child acquires by the growth of his bodily organs a wider scope for action, and by the development of intelligence is enabled to understand the meaning of words. Unless he were prohibited from doing this and that which his love of activity, curiosity, or other impulse, leads him to do, he would seriously injure himself and be a nuisance to others. It would not do in every case to let the child find out the *natural* results of foolish or wrong action. In many cases (*e.g.*, in playing with fire, water, and so on) the experience would be disastrous. In other cases again the child's intelligence would be too weak to detect the relation between action and result. Thus he would not connect over-eating with its effect on his health. With respect to conduct affecting others again, it may be safely said that if children were permitted to tease and molest others, as they are often inclined to do, everybody would soon shun their society.

Artificial restraints, the interposition of authority, are thus necessary. There must be commands laid down, and penalties

Dr. Bain, *The Emotions and the Will*, Pt. II., Chap. XI.; *cf.* H. Sidgwick, *The Methods of Ethics*, Book I., Chap. V. A brief account of the dispute is given by Dr. Bain in his *Compendium of Mental and Moral Science*. The German reader should further consult Volkmann, *op. cit.*, § 151, who adds a very full history of the question; and Wundt, *op. cit.*, Cap. XX., § 2.

attached to the breaking of these. And this system of discipline is a necessary condition of the early growth of character. As we have seen the moral sentiment presupposes some form of external constraint. The first stage in the growth of character is a habit of obedience. Consequently the first requisite in the formation of character is some system of authority, command or law.

Conditions of Discipline. The effect of discipline depends on the fact that certain consequences, and more particularly disagreeable consequences or punishments, are attached to actions of certain kinds. Where this association is wanting there is no moral force supplied. Thus when an impatient mother now scolds and slaps her child for doing a thing, now allows him to do it with impunity, according to her changing mood, there is no motive power applied to the young will. The very beginning of discipline is the institution of a rule or command of a general nature embracing a certain class of actions, and prohibiting these by definite penalties. Hence the most essential conditions of a good discipline.—(*a*) The rule must be intelligible, dealing with distinctions in conduct which the child can understand. The actions prohibited must be simple classes of action, such as taking what belongs to another, saying what is false, and so forth. (*b*) The rule must be enforced uniformly, so that the child will closely associate the action with the consequence; in other words be certain of the evil result of disobedience.

These are the most general or fundamental conditions of what we call discipline. We will now pass to more special considerations affecting the limits and proportion of punishment.

Limits of Punishment. All punishment is suffering, and as such, an evil. More than this, it seems to estrange educator and child rather than bring them together. Finally it is repressive, checking and arresting, instead of evoking and encouraging activity. Hence it can only be inflicted when necessary either for the good of the offender himself or by way of example and warning to others. Vindictive punishment, blows and harsh words administered in temper and as a relief to feelings of annoyance, check the will without disciplining it. Punishment cannot be justified except in cases where it is likely to be effective as a deterrent. Thus it ought never to be inflicted where it is likely to be inoperative through feebleness of will. Children have only a certain power of self-restraint, and of anticipating consequences. Hence to punish them for actions lying beyond their control, as for example crying, may be pure cruelty. Again it is inhuman to punish a child for actions which are in no sense wrong. Trifling faults, such as obstreperousness in an active boy, are not meet subjects for punishment. Great care should be taken before punishing a child for an action to see that there has been an evil intention. Thus it would be immoral to punish a boy severely for breaking a vase the value of which he could not be supposed to know. Also the motive must be taken into account. Thus a child who plucks a flower in the garden in order to give pleasure to a sick brother or sister ought not to be punished. Finally where natural penalties can be counted on, artificial ones should not be resorted to. As Mr. Spencer has shown, a child may be cured, to some extent at least, of such a bad habit as untidiness by being led to experience the ill effects of the habit.

Proportioning of Punishment to Fault. Not only does it need much care to determine what cases are meet for punishment, it is a matter of delicate judgment to decide what the degree or amount of the punishment should be in any case. The most important consideration here is that the punishment is intended to supply a counteracting motive. If it does not supply a sufficient force, it is useless. Weak indulgent parents averse to severe punishment are often unkind in the worst sense by administering slight punishments which are wholly inadequate and so of no good to the child. If on the other hand the penalty is more than adequate for the purpose of counteracting an impulse, the excess is so much cruelty. To determine the proper amount of punishment in any case requires not only a general knowledge of children's feelings and active propensities, but a special knowledge of the sensibilities and impulses of the individual child. Since this knowledge is only acquired gradually it is a good rule to begin with slight punishments, and only go to more severe ones as these prove necessary.

There is room for judgment too in selecting the *kind* of punishment appropriate to a particular fault. The question what sorts of punishment are best, is a very troublesome one. What is wanted is some kind of penalty the evil of which is little affected by differences of individual sensibility, and which easily lends itself to graduation or gradual increase. Over and above these considerations there is another, namely the appropriateness to the particular kind of offence. There is often a certain fitness between a wrong act and the punishment. A child who has neglected his work for play is appropriately punished when he is kept in during play hours to make up arrears.

Enough has been said to show how much scope there is for individual knowledge, good feeling, and tact in administering any system of discipline. It is hardly too much to say that every parent and teacher who has a discipline at all, has his own method of discipline, the moral effects of which vary widely according to the degree of its severity, the fineness of moral discrimination shown, and so on.[1]

Reward, Encouragement. Punishment is for the most part negative in its effect: it deters from action or arrests impulses to action rather than excites to activity. Even where it is employed as a stimulus to action, as when a child is punished for not preparing his lesson, its depressing influence is still seen. The little delinquent feels himself driven or forced to be industrious, and his activity is in consequence put forth without heartiness and even grudgingly. Moreover as a mode of pain, the fear of punishment has only a restricted range. As soon as the minimum quantity of task-work is done the pressure of the motive ceases. As was pointed out above, aversion to pain, though a powerful spring of action, is necessarily limited in its effects.

Discipline includes not only the checking of impulse by deterrents, but the stimulating of activity by positive inducements. That is to say, it makes use not merely of the child's natural aversion to pain, but of his equally natural, and more far-reaching desire for pleasure. It may be a question how far such artificial stimuli are necessary or desirable. Where it is possible it is well perhaps for a child to be industrious, good, and so on, in view of the natural consequence of his action (the good opinion and love of others, &c.). But the weakness of the social feelings in the young makes some amount of artificial stimulation necessary.

[1] On the considerations which should determine the limits of punishment, and the apportioning of it in different cases, the reader should read Bentham's rules quoted by Dr. Bain, *Education as a Science*, p. 106.

And there seems to be a certain correlation between punishment and reward, blame and praise.

Here, again, there is room for wise discernment and moral judgment in determining the right occasion and ground of reward, and the amount of reward merited. Just as in the case of punishment there are the two extremes of over-severity and laxity, so here there are the extremes of lavish and stinted reward. The moral effect of reward will depend much on what is regarded as the ground of merit. We have already seen that the rewarding of absolute, as distinguished from relative proficiency exerts but a limited influence. The incidence of the motive is just where it is (in general) least needed. To this it may be added that the rewarding of effort and industry, as distinguished from intellectual ability, has a much better effect on the growing character of the young. It serves to accentuate and dignify the moral element, the exertion of will, in all intellectual attainment.

Relaxing of Discipline. Discipline both on its negative and on its positive side is intended to be temporary only. It is the scaffolding needed for the building up of the simpler moral habitudes. As the habits grow in fixity, a smaller amount of punishment becomes necessary. Physical pain, loss of liberty, and so on, can now be exchanged for the milder penalties, exposure to shame, private rebuke. A look, or a tone of voice, is enough, in the case of a well-trained boy or girl, to check any nascent impulse to wrongdoing. Similarly as good habits become formed the need of reward grows less. The remuneration of good conduct by tangible gifts is no longer necessary: the word and look of commendation are a sufficient reward. In this way the good habit, industry, punctuality, politeness, becomes independent and self-supporting.

The educator may help on this higher stage of moral attainment by exercising the powers of reflection and judgment, and strengthening the higher emotions. This can be effected to some extent in connection with the processes of discipline themselves. At first the child has to obey unintelligently, blindly, knowing nothing about the reasons or grounds of the rule enforced. But moral training includes much more than the securing of such blind obedience. A moral habit such as veracity, is as we have seen only fully formed when the child's mind has come to reflect about it and voluntarily to adopt it. It is only when he discerns an action to be right, and when he makes free choice of it irrespectively of the penalties attached to the non-performance of it, or the reward following the performance of it, that it is in the full sense his own act, an outcome of his own 'second nature'. The parent and teacher should have this end in view, and seek as soon as possible to enlist the child's intelligence and good feeling on the side of what is wise or prudent, and morally good.

Exercise of Free Will. Over and above this the educator should take care to secure to the child a free region of activity uncontrolled by authority where other feelings besides those specially appealed to in discipline may be exercised as motives, and where the powers of reflecting and choosing may be brought into full play. Nothing is more fatal to will-growth than an excess of discipline permeating the whole of a child's surroundings. Freedom, in the popular sense of the term, that is liberty to decide what to do for oneself, is essential to the development of the will. The educator will find ample scope for the exercise of a fine judgment in determining the boundaries of the several regions of compulsion, persuasion, mere suggestion or guidance, and absolute neglect, or *laissez-faire*. Play owes no little of its moral value to the fact that it provides this area of unrestricted activity.

Discipline of the Home and of the School. The home is the garden of moral character. If the will and moral character are not nourished and strengthened here, they will fare but ill when transplanted into the more artificial surroundings of school life. In the home the whole life is in a manner brought under the supervision of the educator. Not only so, the strong and close affection which grows up between the parent and child gives a unique character to the home discipline. On the one side, the mother is solicitous about her charge as the teacher cannot be, and is far better able as well as much more strongly disposed to study his moral peculiarities. On the other side, the child's feeling of dependence and his love are strong forces tending from the first in the direction of obedience. Here then the foundations of character have to be laid if they are to be laid at all. The relations of home moreover serve to bring out and exercise *all* the moral habits, not only the rougher virtues of obedience, veracity, the sense of right and justice, &c.,

but the more delicate virtues of sympathy, kindliness, and self-sacrifice.

Contrasted with this the discipline of the school has but a very restricted moral effect. The immediate object of school discipline is indeed not moral training at all, but rather the carrying on of the special business of the school, namely, teaching. Incidentally the management of a school necessarily does subserve moral education, calling forth habits of obedience, orderliness, industry, deference, &c. And the teacher is expected to make the best of his opportunities for training the will and forming the character of his pupils. The limitations here are obvious. The first is the restricted range of life brought under the master's control. School occupations are a kind of artificial addition to the child's natural life, and offer but little play for his characteristic tastes and inclinations. Again, since the teacher has to do with numbers there must necessarily be wanting the aid of those moral forces of close individual sympathy and strong personal attachment which play so important a part in home discipline.

These defects are, however, made good to some extent by the presence of a new agency in the school, namely that of public opinion. We have already touched on the effect of this in shaping and giving strength to the growing moral sentiment of the individual. To this must now be added that the existence of public opinion, of a mass of corporate feeling on the side of order and right conduct, is a powerful force working in the direction of good conduct. Such a body of sentiment may, indeed, be said to be, in these days at least, a necessary support of the master's authority. It is to the schoolmaster what public opinion is to the ruler of a state. School experience familiarises the mind of the boy with the fact that he is a member of a society, that the command to be brave, or truthful, is enjoined by the voice not of an individual but of a community. In this way he learns to regulate his actions by a reference to a social law, and a common rule of conduct.

The effect of the ideal school régime, the master removed at a certain distance, inspiring a feeling of awe, the little society of the school sustaining his authority and following out the principles and spirit of his discipline even in the playground and in his absence, is to cultivate a certain type of moral character which is in a manner supplementary to that specially cultivated by home surroundings. The mind acquires a manly tone of self-reliance, and the severer virtues, obedience and respect for law, courage, ambition, sense of honour and of justice, are nourished. Where this régime is happily favoured by the presence of a fine and admirable personal character in the governor, and of a healthy and lofty public spirit among the governed, it is capable, as we know, of doing much to mould the permanent character.

APPENDIX.

On the nature of the processes of Deliberation and Choice, see Prof. Bain, *Emotions and Will*, Ch. VII. ; Dr. Carpenter, *Mental Physiology*, Ch. IX., § 4 ; H. Spencer, *Principles of Psychology*, I., Pt. IV., Ch. IX. The German reader may consult Th. Waitz, *Lehrbuch der Psychol.*, § 43 ; W. Wundt, *Physiolog. Psych.*, II., Ch. XX., § 2. On the nature of Moral Habit and of Character, see Bain, *op. cit.*, Ch. IX. ; Carpenter, *op. cit.*, Ch. VIII. ; Volkmann, *Lehrbuch der Psychologie*, § 154.

On Discipline and the Formation of Character, see Locke, *On Education* especially §§ 32-117 ; Miss Edgeworth, *Practical Education*, Chap. IX. ; Mdme. Necker, *L'Education*, Livre I., Chap. IV.-VI. ; and Livre VI., Chap. IV. ; H. Spencer, *Education*, Chap. III. ; Bain, *Education as Science*, pp. 100-119 ; Beneke, *Erziehungs und Unterrichtslehre*, Cap. II., 'Gemüths- und Charakterbildung' ; Waitz, *Allgemeine Pædagogik*, §§ 11-15, pp. 140-213.

APPENDIX A.

METHOD AND DIVISIONS OF PSYCHOLOGY.

PSYCHOLOGY is in the unenviable position of being the only science which needs to establish or justify its mode of procedure. This obligation is connected with the peculiar nature of its subject-matter, and its peculiar position in relation to the physical sciences.

(A) SUBJECTIVE METHOD. Since psychology aims at observing, classifying, and explaining mental facts, it is evidently compelled in the first instance to resort to introspection or self-observation. The status of the science must thus be determined ultimately by the value of this source of knowledge.

At first sight it might seem as if the facts of the inner world, being directly present in the mind, would be more easily apprehended than those of the outer world. Yet it has been contended by philosophers as Auguste Comte, and by biologists as Dr. Maudsley, that this instrument of research is valueless, and that consequently no science of psychology is possible.

The main objections to the introspective study of mind are as follows:—(1) It is impossible for the mind to be at the same time the observer and the thing observed. As Comte puts it, "the thinking individual cannot divide himself in two, of which one reflects, while the other sees it reflect". This is the main and fundamental objection. The difficulty is seen most plainly in the case of mental states, such as violent feeling, which preclude the attitude of calm contemplation. (2) Again, even if there were not this fundamental difficulty in the way of self-observation, there would be another. Unlike the external sphere of physical phenomena, the internal region of mind is only observable by one observer. Hence there is no possibility of supplementing and correcting A's reading of a phenomenon by B's and C's. (3) If there were not these difficulties in the way of accurately studying any phenomenon of mind by self-observation, the range of such observation would, it is evident, be very circumscribed. For (*a*) it only gives us knowledge of a single concrete example of mind, whereas a scientific knowledge presupposes the observation and comparison of many and widely-unlike instances. And (*b*) even within the limits of this one mind the area of accessible fact is very small relatively to that of the whole mental life. It is confined to recent psychical states. As soon as we attempt to reach back to remote states we secure only shadowy phantoms of the realities, and are exposed to all the errors incident to memory.[1]

These objections, though pointing to real difficulties, have been greatly exaggerated. They are not fatal to the claim of introspection to be the source of a sufficiently accurate knowledge of a certain limited range of psychical fact. By a careful methodical procedure, reflecting on the mental state at the right moment, recalling and comparing with it previous states, &c., the sources of error may be considerably reduced. Lastly, by a comparison of the results of different individuals' self-observation a means is available for reducing, if not eliminating, the personal error, and for greatly extending the range of facts obtained. Psychology has grown by the constant juxtaposition of the fruits of self-observation.[2]

(B) Objective Method. While not fatal to the claims of introspection to be the source of some knowledge, these objections plainly show that it is unable to give us a wide and general knowledge of mind. Hence the need of supplementing this direct source of knowledge with another and indirect. This is the external or objective observation of mind.

(1) This includes first of all the widest possible study of the human mind by means of its external effects. Here we have the observation of different individual minds by means of their words and actions, whether known to us personally or through the account of others, or the page of literature. In order to make this observation comprehensive and fruitful we must be careful to include widely-unlike types of mind, due to differences of sex, temperament, and surroundings; also all stages of mind-growth, and particularly the phenomena of child-life; and further striking and exceptional instances of mind, as seen in the biographies or autobiographies of celebrated men, of those abnormally constituted, more especially those wanting in a sense or senses, as the blind, the deaf, &c.[3]

[1] For an account and criticism of Comte's views, see J. S. Mill, *Auguste Comte and Positivism*, p. 63 *seq.* Dr. Maudsley's objections are stated at length in *The Physiology of Mind* (1876), Chap. I., p. 15 *seq.* The main objections urged against introspection, including those of Kant and Lange, are fully set forth by Brentano, *Psychologie*, Buch I., Cap. 2.

[2] *Cf.* my volume on *Illusions*, Chap. VIII. (Illusions of Introspection), p. 208 *seq.*

[3] The psychological bearing of the observations made on the blind will be spoken of presently in a separate appendix. The observation of deaf-mutes

This leads us to consider the importance of observing the facts of mental disease. The great value of mental pathology to the psychologist is that it presents to him the phenomena of mind (*e.g.*, feeling, imagination) in unusual intensity; further that it brings about a variation of circumstances and enables him the better to understand complex phenomena (*e.g.*, volition) by isolating the different elements; and lastly that it helps to confirm the theory of mental *evolution* by exhibiting the reverse order of mental *dissolution.*

Finally, this study of the facts of the human mind should include the manifestations of the collective mind in social products, such as language, beliefs, sentiments, and customs. The study of the psychical characteristics of early races has added an important group of facts to the science of mind.

(2) A perfectly comprehensive study of mind should embrace the widest and most accurate observation of the mental life of the lower animals. Though widely unlike the phenomena of the human mind, these lower types of mind offer valuable material to the psychologist in the shape of elementary psychical phenomena.

It must not be supposed that this objective study of mind is above scientific suspicion. So far from this being the case, it may be said to introduce new sources of error. As Volkmann remarks, "The mental life of others can only be observed in so far as it manifests itself externally, and in this manifestation is correctly comprehended by the observer. With respect to the first condition, a wide field is opened up to deception, designed and undesigned; with respect to the second, the region of observation is narrowed to those phenomena for which the observer, by reason of his self-observations, has already found the commentary and the analogies; to the possible deceptions in the utterance, there are added the inevitable errors of self-observation."[1] Autobiography illustrates the first source of error, and is consequently (as Volkmann adds) a very untrustworthy means of knowledge. The difficulties and liabilities to error connected with the strangeness of the phenomena and the absence of an adequate medium of expression, are illustrated in the want of agreement as to the nature of the primitive type of mind, the child-mind, and the animal mind.

and of their manual language is of great use to the psychologist as throwing light on the nature and functions of language. One of the most interesting cases of deficiency of sense is that of Laura Bridgman, who at the age of 26 months lost sight, hearing, and to a large extent smell and taste, and who, notwithstanding, as the result of a scientifically conceived and carefully followed out plan of education, attained to a considerable height of intellectual and moral development. A full and interesting account of the facts is given by Prof. G. S. Hall in *Mind*, Vol. IV. (1879), p. 149.

[1] *Op. cit.*, Vol. I., p. 43.

The great value of this objective study resides in two circumstances: (1) that since mind here manifests itself externally, any given manifestation can be studied by a number of observers; and (2) that owing to the much larger range of facts here presented, the risk of error in particular cases can be better eliminated by a wide comparison of facts.[1]

LOGICAL METHOD IN PSYCHOLOGY: ANALYSIS AND SYNTHESIS. The respective values of these different sources of knowledge respecting psychical facts will appear more plainly if we keep clearly in view the aim of psychology and the logical methods to be followed. Briefly we may say that psychology has to classify mental phenomena and to determine the laws of their production, to show how simple states combine in complex states. Now this can be effected in one of two ways.

(a) We may proceed, first of all, from effects to antecedent conditions, products to factors. This mode of proceeding in psychology is commonly spoken of as the analytical method. It may also be called the inductive method, since the general laws respecting the aggregation and production of mental states are in the first instance reached in this way.

(b) In the second place, we may set out from elementary facts, and by help of certain laws of composition (reached by the analytical way, supplemented if necessary by hypothesis) reconstruct the successive stages of psychical production. This is the synthetical method in psychology. It may also be called the genetic method. It is deductive in so far as it reasons down from laws reached by previous inductions or by hypotheses.

It is plain that the analytical method is that necessarily pursued in self-observation. The self-observer is an adult, face to face therefore with a highly complex psychical organism. He has to set out from complex products. In external observation, on the other hand, though analysis enters in, synthesis is the great methodical weapon. Here we are able to reach comparatively simple or elementary phenomena of mind (*e.g.*, in children, primitive races, animals), and thus we complete the analytical study of mind by seeking to build up the complex structure of mind out of certain simple materials or elements.[2]

[1] On the difficulties of ascertaining the facts of mental life in the case of the lower animals, see my volume *Sensation and Intuition*, pp. 15, 16; *cf.* G. H. Lewes, *The Study of Psychology*, p. 118 *seq.* For a careful account of the different sources of knowledge respecting mind, see Brentano, *loc. cit.*

[2] See M. Taine's following up of analysis by synthesis, *On Intelligence*, Part II., Book I., Chap. I.; *cf.* Volkmann, *Lehrbuch der Psychologie*, p. 39. The difficulties of such psychological synthesis are connected with the fact that the elements which combine to produce a complex result are not always discoverable even by close scrutiny in this last. In other words, there are

Study of Mind and Nervous Conditions. The study of psychical phenomena in connection with the physical *conditions* as distinguished from the external *effects* of mental life is, as was pointed out above, one important department of the objective investigation of mind. It is strictly subordinate to the observation of mind itself. That is to say, the relation between the physical and the psychical process can only be ascertained by help of a properly psychological observation of the latter. But inasmuch as it seeks to determine the physiological conditions of mental states it may (as in the objective analysis of sensation) transcend the limits of distinct introspective analysis. This mode of investigation is capable of being combined with all the modes of objective observation cited above, that of specially endowed individuals, abnormal states of mind, primitive types of mind, and the animal mind. So far it has been of use to the psychologist mainly in the lower departments of psychology (theory of sensation and movement). In the higher departments the method of research is greatly restricted. The complex phenomena of thought, emotion, and volition are not as yet susceptible of being investigated by the physiological method.[1]

With the study of the physiological conditions of mind is closely connected the experimental study of mental phenomena. The method of psycho-physics clearly proceeds by noting as accurately as possible the relation of psychical phenomena to well-ascertained physical processes, and so leads on to a fuller understanding of the relations of mental phenomena to nervous conditions. And the same remark applies to the new and highly-promising department of inquiry which aims at determining the duration of psychical processes. Here, too, psychical phenomena are studied in the closest connection with their physical conditions. The peculiar value of this region of research is that it is an attempt (within certain limits) to give quantitative precision to psychology, an object which Kant held to be impossible, and which Herbart attempted without any aid from physical investigations.

Divisions of Psychology. Psychology is the science of mind in general, and so embraces the investigation of all varieties of mental life by whatsoever methods. Hence in a strict sense there is but one science

certain laws of *coalescence* of mental states, or what Mill called a mental chemistry. It follows that we can only imperfectly deduce the successive phases of mental development by setting out with certain elements, sensations, and assuming certain laws of coalescence. See Waitz, *Lehrbuch der Psychologie*, p. 24 *seq.;* and J. S. Mill, *System of Logic*, Book VI., Chap. IV., § 3.

[1] The limits of the physiological study are clearly pointed out by Brentano. He argues against Horwicz that "not only the retirement of psychological research in favour of physiological, but the admixture of the latter to a considerable extent, is inadvisable" *(op. cit.*, p. 83).

of psychology.[1] For practical purposes, however, it is convenient to distinguish between different branches of the science.

(1) At the head of this scheme we have what may be called Abstract Psychology, or the general psychology of the human individual. This is the modern representative of the older psychology. It sets out with the study of mind in a highly developed form, namely in members of a civilised community, as that most accessible to us, and of most practical interest. Hence its method is to a considerable extent that of introspective analysis. The problem of synthesis is limited to explaining the successive stages of the development of the individual mind. The addition of the physiological mode of investigation serves to differentiate a certain portion of this field as that of Physiological Psychology; and the special section of this area again which employs experiment (psychophysics, &c.), might with advantage be marked off as Experimental Psychology.

(2) In addition to this more abstract or general study of mind we find more concrete or special branches of study. Thus there is the great department of Mental Pathology in which the study of nervous conditions is a prominent feature. This depends to a considerable extent on the psychology of the normal mind, though in its turn it contributes new illustrations and further verifications of this psychology. Then there are more special subdivisions within the bounds of normal life. These include the comparative study of different types of individual and of race, what Mill called Ethology, or the science of character, together with what the Germans call *Völkerpsychologie*, or the investigation of language, manners, &c., in different communities and races of men, more particularly backward ones. These more concrete departments of the science obviously depend on abstract psychology, in so far as we here apply to special groups of circumstances principles obtained in the leading branch of the science. The study of the social products of mind in simple types of society indicates the point where psychology overlaps or passes into sociology.

Finally under this more special psychology we have what is most commonly understood by Comparative Psychology, namely the study of mind in the several groups of animals and grades of animal life.

(3) As the latest development of the science we have Evolutional Psychology. This may be said to include all the others. It is a vast extension of the genetic treatment of mind. It has only become possible by the modern extension of the objective study of mind. More particularly, it has grown out of a wide and careful comparative study of mind in different stages of human and of animal development. This theory of mind regards the processes of mental development in the individual as parts of a much longer process, namely the development

[1] This is well shown by Volkmann, *loc. cit.*

of the mind of the race; and this vast process, again, it connects with a far vaster one, namely the gradual evolution of mind in the zoological scale. If abstract human psychology is the base, evolutional psychology may be called the apex of the science.[1]

APPENDIX B.

THREEFOLD DIVISION OF MIND.

THE tripartite or threefold classification of mental phenomena adopted in this volume, though the common one in modern works on psychology, is not universally accepted. The ancient division as fixed by Aristotle was a bipartite or twofold one, intellect and will, or according to Aristotle, thought (νοῦς) and desire (ὄρεξις). This remained the customary division in the middle ages. It survives in the classification of Reid, (1) Intellectual Powers and (2) Active Powers. Here feeling is subsumed under one or both of the other divisions.

The present tripartite division was introduced by German psychologists (Tetens and Mendelssohn), and made prominent and authoritative by Kant. It rests on the essential and radical dissimilarity of the three orders of phenomena.

Supposing it to be allowed that feeling, intellect, and volition are perfectly distinct groups of mental states, there remains the question whether they are equally fundamental, primordial, or independent. This question has been answered in different ways. Thus Leibniz, Wolff, Herbart and his followers, regard intellect or the power of presentation (Wolff's *vis repræsentiva)* as the fundamental one out of which the others are derived.[2] Hamilton, who strongly insists on the generic distinctness of the three classes, feeling, knowing, and willing, goes a certain way in the same direction when he says that "the faculty of knowledge is certainly the first in order, inasmuch as it is the *conditio sine qua non* of the others". By this he means that we only have feelings or desires in so far as we are conscious of them, and that con-

[1] On the relation of the evolution psychology to the abstract psychology of the individual mind, see my volume, *Sensation and Intuition*, Chap. I.

[2] The power which the Germans indicate by the verb *vorstellen* and the correlative noun *Vorstellung, i.e.*, to set before the mind or posit as object, includes the presentative and representative faculty.

sciousness is knowledge. He adds that though he can conceive a being all cognition, he cannot conceive one all feeling and volition.[1]

The relation of the three classes of mental phenomena is well defined by Lotze. He shows that they do not answer to three branches springing up side by side from the first. Feeling is mostly called forth by intellectual states (presentations and representations), and desire and will have feeling as their antecedent condition. Yet this does not entitle us to say that representations are the adequate cause of feelings, or feelings of volitions. By simply considering the mind as capable of having presentations we could never discover any reason why it should pass into the new mode of manifestation, feeling of pleasure or pain. Similarly we cannot derive the active element of striving from feeling. The later mode of manifestation, though presupposing the earlier as its antecedent condition, implies an independent and pre-existing capability.[2]

While feeling has thus been denied by many the status of an independent variety of mental state or phenomenon, an attempt has recently been made by Horwicz to regard it as the primordial type of mental manifestation. This assertion is based on the fact that in the early stages of mental development both of the individual and of the animal series the element of feeling (sense-feeling) is conspicuous and predominant. To this argument Schneider replies that in the simplest sensational consciousness there is involved a rudiment of intellection in the shape of the discrimination of a state as favourable or unfavourable.[3]

The tripartite division of mind is, as pointed out, based on differences of nature or kind in the groups thus marked off, and has in the

[1] For an historical account of the various modes of classifying mind, and for his own view, see *Lectures on Metaphysics*, Vol. I., Lect. XI. Since, however, Hamilton allows the existence of unconscious mental states, "latent mental modifications," it seems to follow that the intellectual condition of consciousness is only necessary to feeling and willing in their higher or fully developed forms.

[2] *Mikrokosmus*, I., p. 199 *seq.*

[3] See Horwicz, *Psych. Anal.*, Theil I., Abschn. VI., and Theil II., Hälfte 1; *cf.* G. H. Schneider, *Der menschliche Wille*, Kap IX., p. 190 *seq.*; and J. Ward, *Mind*, Vol. VIII. (1883), p. 472. The tendency to deny feeling the rank of a separate mode of consciousness is due not merely to the fact that in its higher forms it presupposes intellection, but to the circumstance that as a passive phenomenon it seems to be less important than the others, and not to indicate any specific type of psychical activity. This tendency to make activity the essential ingredient in mental states shows itself in the attempt to regard volition (desire or striving) as the fundamental activity of mind. To this idea, which is frankly expressed in Schopenhauer's psychology, Wundt appears to lean in his doctrine that impulse (Trieb) is the fundamental psychical phenomenon (*Physiol. Psychologie*, Cap. 24, § 2).

first instance no reference to the order of their appearance. This order is indeed indicated in the usual arrangement—(1) Knowing, (2) Feeling, and (3) Willing. A direct consideration of order, instead of ultimate or radical difference of nature, tends to another mode of division, as we find in Aristotle's division of vegetative, sensitive, and intellectual soul. This principle of division underlies Brown's bipartite classification, external affections (sensations) and internal affections (intellectual and emotional states).[1]

APPENDIX C.

MIND AND BODY.

As pointed out, empirical psychology does not inquire into the nature of mind or of the meaning of its connection with the bodily organism. Nevertheless it is plain that the study of the phenomena of mind naturally leads on to the philosophic or metaphysical question of what mind is itself as substance or active principle, and how we are to conceive its conjunction with a material substance. The bearing of this question on the highly interesting problem of the immortality of the soul has led to the devotion to it of much space in works which exceed the limits of empirical psychology and venture into the region of rational or speculative psychology.

The bearings of empirical psychology on these problems may be briefly indicated as follows: (1) What view does a consideration of the phenomena of mind lead us to entertain respecting the inmost nature and ultimate sources of mental activity? More particularly, does it lead us to the hypothesis of a spiritual substance or soul distinct in its nature and mode of activity from material things? (2) What does a thorough-going study of the physiological conditions or concomitants of mental phenomena lead us to regard as the real relation between mind and body? And how is this relation to be interpreted from a philosophical point of view?

These different lines of inquiry have been necessarily pursued together. The discussion as to what mind is in itself passes on to that of the relation of mind to its foreign companion, a material organism.

[1] The division according to radical qualitative differences may be called the longitudinal section of mind: that according to order of development the transverse section. The division of intellect into fundamental functions and into faculties, and of feeling into pleasure and pain, and into sense-feelings and emotions, illustrates the same difference in the mode or principle of division.

And the attempt to interpret the fact of the concomitance between the physical and the psychical has necessarily involved a consideration of the question what mind is as substance. But sometimes the one, sometimes the other question has assumed special prominence.

It has been suggested above that the properly psychological study of mind has no tendency to reduce mental phenomena to terms of matter and movement. The fundamental modes of mental manifestation, feeling, knowing, and willing, and the laws which govern their development, are perfectly distinct from the phenomena and laws of the material world.

With respect to the connection between body and mind physiological psychology is in a fair way to make out that all psychical activity has as its concomitant some mode of physical action. Mental life is thus a chain of events parallel to another chain of physical events. More particularly mental life coincides with a certain central portion of the nervous series, namely cerebral processes. Are these series independent of one another, or is there any causal connection and interaction between them? Is the psychical event the result of the first stage, sensory stimulation? On the other side, is the mental process a condition of the final stage, the muscular action? Or is this a case of mere parallelism without actual causal contact?[1]

These questions have not yet been answered by accepted scientific methods. The physiologist setting out with physical phenomena as his realities and following the familiar methods of physical science, is disposed to regard the chain of nervous events as complete and self-explanatory, and to view the accompaniment of consciousness as an accidental appendage or "collateral result" of the physical events. On the other hand, the psychologist setting out from the inspection of the internal series of psychical events maintains that these are at least as real as the physical processes and cannot be brought under the general effects of physical action; also that they must be included as co-operant factors or agents in the whole complex series. It would thus appear that in the concomitance of the physical and the psychical we have a unique fact not to be explained by being brought under the ordinary laws of physical causation.[2]

[1] See a careful presentation of the facts by Dr. Bain in his *Mind and Body*, Chap. VI.

[2] See the account of the hypothesis that man is a 'conscious automaton,' that his actions are adequately accounted for by the mechanism of the nervous system, and the criticisms of the doctrine, in G. H. Lewes' *Physical Basis of Mind*, Prob. III., especially Chap. VII. The psychological view of the connection between psychical and physical events seems opposed to the theory that psychological laws are derivative laws resolvable into physiological laws. See Mill, *Logic*, Book VI., Chap. IV., § 2.

The insolubility of this question by commonly accepted scientific methods, and the double way of approaching its solution, are clearly illustrated in the different philosophical theories propounded to meet the case. On the one hand, we have as the earliest attempt to solve the mystery, Materialism, or the doctrine that the material body is the only substance and active principle, and that what we call the mind is an effluence from, or product of, the activity of this substratum.[1] Over against this tendency we have Spiritualism, or the doctrine that the material body is relatively dead or inert and unreal, and that the principle of life and activity is a spiritual principle. The materialistic tendency allied itself to a mechanical view of nature, which seeks to reduce organic life to the effect of mechanical arrangements. The spiritualistic tendency, on the other hand, led rather to a teleological view of nature, to the theory that so-called inanimate objects are vitalised by a principle which involves purpose or end.

Beside these tendencies acting singly we have combinations of them which aim at giving equal substantive reality and power to the material and to the mental or spiritual. The first crude form of such a combination is Dualism, according to which two co-ordinate substances exist side by side, but exert no influence one on another; the appearance of interaction being due to a Divine arrangement.[2] Finally the desire to meet the claims of each of the two connected terms and at the same time to account for their connection or union has given rise to the doctrine of Monism, according to which the material and the mental are related as two attributes of the same substance, or as two aspects of one reality, like the convex and concave sides of a curve.[3]

[1] According to the first crude form of Materialism, the Soul was merely a portion of finely attenuated matter, a thin unsubstantial image of the body. See the account of early Animism in Mr. E. B. Tylor's *Primitive Culture*, I., p. 387.

[2] Modern science is opposed to this doctrine in so far as it assumes a stage of purely mental activity intervening between two stages of physical action. See Bain, *loc. cit.*

[3] For a detailed account of the main historical theories respecting Body and Mind, see Volkmann, *op. cit.*, §§ 18-22; *cf.* Wundt, *op. cit.*, Cap. XXIII. Volkmann classifies them as above. Wundt on the other hand recognises three main types, viz., Materialism and Spiritualism, each of which has a dualistic and monistic form, and Animism. Dr. Bain (*op. cit.*, Chap. VII.), recognises two main groups, I., those which adopt two substances; II., those which assume but one. This points to the difficulty of any exhaustive classification of the theories by help of one simple principle.

The reader must carefully distinguish the philosophic question having to do with the relation of mind as knowing subject and material bodies as objects, from that having to do with the relation of concomitance of

APPENDIX D.

VISUAL INTUITION OF SPACE.

THE question as to the exact nature and mode of development of the visual intuition of space has given rise to much discussion, and cannot be said to be yet fully solved. The contention of Berkeley that seeing is based on touching, is the boldest result of the philosophical tendency known variously as Empiricism, Associationism, or Sensationalism, to trace back all knowledge, however immediate and intuitive in appearance, to antecedent experience and association; and as such it has been strongly opposed by Intuitionists, that is those who maintain that the mind has independently of experience certain intuitive cognitions. Berkeley's theory has also been opposed by followers of Kant on the supposition that it is irreconcilable with this thinker's conception of space as the mental form or mould into which all sensations must be received.[1] As pointed out, however, in the earlier part of this work, it is important to keep as distinct as possible the psychological and philosophical problems here involved. What the objective import and validity of the space-representation is when we have it is a philosophical question, which had better be discussed after the psychological one, how or by what succession of psychical elements the representation arises.[2]

Here there are, strictly speaking, two questions which have not always been carefully distinguished—*(a)* Is there a purely visual space-intuition, independent of touch? *(b)* If so, is this (wholly or in part) perfect from the first or innate, or is it a development from visual ele-

mind and body in the human individual. They set out from two distinct starting-points, the relation of subject to object as given in the perception of external things, and the concomitance of mind and body which is a fact of everyday experience. The terms Realism and Idealism indicate the first problem, while Materialism and Spiritualism point to the second. It is plain that the second problem is more closely bound up with psychology than the first. Yet while starting from different points these lines of inquiry tend to intersect. For the body is clearly a material object, and its nature cannot be determined except by a reference to the meaning of 'object'. On the other hand, the consideration of the union of mind and matter in human and animal organisms leads on to the conjecture that all material things have as a part or the whole of their reality a quasi-mental element.

[1] I have discussed the relation of this question to the Kantian problem in *Mind*, Vol. III. (1878), p. 193, &c.

[2] The term representation is used here for brevity's sake as an equivalent of the German Vorstellung, that is as covering both the presentation (perception) and representation (image) of space.

ments? In this country the second alternative has not been clearly kept in view. It has commonly been assumed that if the visual representation is independent of touch it is complete from the first. Hence the discussion has of late centred about the interpretation of the observable phenomena *in the first stages of vision.* The anti-Berkeleians have sought to show that the facts here ascertainable favour the doctrine that the visual perception of space is in its essentials present from the first.[1]

Two groups of facts naturally offer themselves here—(1) those of infant-life, (2) the experiences of the blind. In each case, it is obvious, the facts are exceedingly difficult to reach. Hence they have not yet proved themselves to be decisive one way or another, though there is little doubt that with improved methods of observation they will do much to solve the problem.

With respect to the first group of facts, it is evident, first of all, that the infant falls far below the young of the lower animals in visual power. It has been proved by Mr. Spalding that a chick will peck from the first with perfect aim at so small an object as a worm.[2] This clearly involves an inherited group of nervous co-ordinations of sensory and motor elements which are wanting in the case of the child. The infant learns to fix his two eyes on an object, to follow one when moving, and to vary the degree of convergence, from about the third week on. Thus a certain amount of experience is necessary to the co-ordination of retinal sensations and ocular movements. A still longer time, namely from 7 to 9 weeks, is needed for co-ordinating visual impressions and arm-movements. The act of stretching out the hand to seize an object occurs first about this time. This movement is at first far from precise, since the arm often passes to the side of the object, and it only acquires precision by practice. These facts hardly seem conclusive with respect to the nature of the child's first visual experiences. They may, however, be said to favour the theory adopted in this work that the visual perception of space is not perfect at first, but is developed by the aid of experience, though the rapidity with which ocular and manual adjustments are acquired supports the theory of the co-operation of inherited nerve-connections.[3]

[1] The doctrine that the visual perception of depth though not present at first in a perfect form is developed by Visual Experiences alone is maintained by E. Hering. See the article already referred to in *Mind,* Vol. III., p. 172 *seq.*

[2] Mr. Spalding kept the chickens carefully hooded for two or three days after they had left the shell, and then observed their actions. See *Macmillan's Magazine,* Feb., 1873.

[3] Children seem to vary considerably in respect of the rapidity of these acquisitions. Thus Donders speaks of a child that a few minutes after birth could fix an object, follow it when moving sideways, and even vary the degree

The experiences of the blind have received much more attention. On the one hand, the congenitally blind have been questioned as to their ideas of space gained by way of movement and touch. But the facts here are exceedingly scanty. Platner, a German physician and philosopher, describes the results of some observations of his on a blind subject. The results, he contends, go to show that "the sense of touch by itself is altogether incompetent to afford us the representation of extension and space". The patient appears to have thought of space as a *succession* of sensations merely. This bears out the theory that the perception of coexistence presupposes more than mere experiences of movement, namely a number of simultaneous impressions; which condition is obviously realised far more completely in the case of the eye than of the organ of touch. At the same time, it seems likely, in view of the geometric and other attainments of the blind, that Platner underrated the powers of unaided touch in leading the mind to the representation of coexistent points.[1]

The observation of the congenitally blind goes to show how much touch can teach apart from sight. This is supplemented by the observation of those cured of congenital cataract with a view to discover how much sight can teach at first before there has been time for the building up of associations with touch. Here we have a number of observations, including the familiar cases of Cheselden's and Dr. Franz's patients. These, however, though of great interest are far from being satisfactory. Thus there seems to be some question how much the patients were able to see previous to the operation. Cheselden's patient was a boy of about 12. After the operation, when able to see objects, he showed at first no discriminative perception of distance. "He thought all objects touched his eyes, as what he felt did his skin." He could not distinguish the shape of one object from another by sight alone. Two months after he was couched he discovered that pictures (which he had previously viewed as ordinary surfaces) represented solid bodies, though now he fell into the error of taking them for the actual objects themselves, as children take the shadow of an object on the wall for a body in relief.[2]

The account of Dr. Franz's patient is much fuller and more exact. The patient was a youth of 18. His sense of touch had attained a remarkable degree of perfection, the lips being specially employed in the minute inspection of objects. After the operation he was subjected

of convergence when brought nearer or moved further off. Quoted by Stumpf (*Ueber den psychologischen Ursprung der Raumvorstellung*, p. 295). For a fuller account of the facts see Preyer, *op. cit.*, p. 25 *seq.*, and p. 122 *seq.*

[1] For an account of Platner's observations, see Sir W. Hamilton's *Lectures on Metaphysics*, Vol. II., p. 173, &c.; *cf.* J. S. Mill's *Examination*, p. 278.

[2] For an account of Cheselden's case, see Sir W. Hamilton, *op. cit.*, p. 176 *seq.*

to careful observation. The object was at first to discover how far he could discriminate lines, &c., that is elements of form presumably cognisable by sight alone. He was able after a little inspection to distinguish between a vertical and a horizontal line as such, that is to say which was the horizontal, and which the vertical. He also distinguished a circle, square, and triangle, as such. After this the inquiry was directed to ascertaining how much he could discern with respect to the distance and solidity of objects. He took solid objects as a cube, a sphere, &c., for flat surfaces. He could not distinguish between the position of an object floating on the surface of some water, and another object sunk one foot below. All objects appeared so near to him that he was afraid of coming in contact with them. He had no idea of perspective, and could not understand pictures. He saw even a familiar object of touch, such as the human face, as a flat plane.[1]

These observations are far from conclusive, as is seen in the different interpretations given of the facts by writers of the two opposed schools. As Stumpf observes, "they are of less value as a means of deciding the point, than as a field for the exercise and confirmation of theories already established". It may, however, be said that they give a certain support to the theory expounded above—(1) that with respect to the perception of superficial form-elements sight is largely independent of touch, though owing to the analogies between sight and touch experience each tends to recall the other;[2] and (2) that with respect to the perception of depth, sight is dependent on touch.[3]

[1] For a full account of Franz's observations, see Prof. Mahaffy's *Critical Philosophy for English Readers*, Vol. I., Pt. I., p. 122, &c.

[2] This, as Mill points out (*op. cit.*, p. 289, note), would help to account for F.'s patient recognising a line as horizontal, and a figure as triangular.

[3] For a fuller discussion of the meaning of these facts, see Hamilton, *loc. cit.*; J. S. Mill, *loc. cit.*; Prof. Mahaffy, *loc. cit.*; and Stumpf, *loc. cit.*

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Pity for Ye who work – nay slave – for Howison. – and get no return.
Verily He is a hard master.