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NOTE ON CRESCAS'S DEFINITION OF TIME

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In *Or Adonai*, I, ii, 11, after refuting the Aristotelian definition of time reproduced in Maimonides' fifteenth Proposition, Crescas puts forward a new definition of his own. It reads as follows: ולזה הגדר הנכון בזמן יראה שהוא שעור התדבקות התנועה או המנוחה שבין שתי עתות. The term התדבקות generally means 'continuity' and 'cohesion', and is contrasted with התפרדות or התפרקות, which mean 'discreteness' and 'disjunction', as, e. g., in the expressions כמה מתדבקת and כמה מתפרדת corresponding to the Greek *συνεχές* and *διωρισμένον* in *Categories*, IV. Taken in this sense, Crescas's definition of time would have to be translated as follows: '. . . . the measure of the continuity of motion or of rest between any two instants'. To be sure, the expression 'the measure of the continuity of motion or of rest' is meaningless. But it could be explained with the help of a similar expression which occurs in Gersonides' discussion of Aristotle's definition of time (*Milḥamot*, VI, i, 21). Among the several tentative interpretations of Aristotle's definition discussed by Gersonides, there is one which but for the absence of the expression 'or of rest' is like that proposed here by Crescas. It reads somewhat as follows: Time is the measure of motion between two instants. אם שנאמר שהזמן אשר ישער התנועה הוא מה שבין העתות אשר יחלקו התנועה, וזה אמנם יהיה כשיהיה משער התנועה אשר בין העתות ההם. Now, previous to his statement of this defini-

tion, Gersonides refers to the portion of time included between two instants as a 'continuous quantity' bounded by instants. : והוא מבואר שהעתה ימצא לו שני צדדים מהמציאות האחד . . . והאחר, הוא הגבלת הכמות המתדבק, והוא הגבלת החלק האחד מהזמן. Accordingly, the expression 'the measure of the continuity of motion' in Crescas's definition could be taken to mean 'the measure of the continuous quantity of motion', the term התדבקות התנועה being equivalent to הכמות המתדבק של התנועה. Crescas's definition of motion, therefore, with the exception of the expression 'or of rest' would thus be identical with one of the tentative definitions discarded by Gersonides. It is somewhat in this sense, in fact, that the definition is taken by Eisler in his *Vorlesungen über die jüdischen Philosophen des Mittelalters*, 3, p. 144. 'Die Zeitdauer wird an der Ruhe oder an der Bewegung zwischen zwei Zeiten gemessen; die Zeit ist also das Mass für die continuirlichen Quantitäten, wie die Zahl für nicht zusammenhängende Quantitäten.'

This interpretation of the definition, however, involves some difficulties. Were this its meaning, it is strange that Crescas should take no notice of the objections raised by Gersonides against this definition. Furthermore, if that were the meaning of Crescas's definition, he has failed to prove his main point, namely, the absolute separation of time from motion. His addition of the terms 'or of rest' in the definition does not achieve that purpose, for rest is merely the negation of motion—an objection which, despite Crescas's attempt to explain it, is insisted upon, as we shall see, by one of his critics.

It is therefore necessary that the term התדבקות be rendered here not by 'continuity', but by 'continuance', or rather 'duration'. The definition thus translated assumes

an entirely new meaning, the significance of which I shall point out after a brief discussion of its origin. It can be shown that the term התדבקות was known to Crescas to have the two meanings of 'cohesion' and 'duration'. Thus in *Or Adonai*, I, i, 13, he suggests that the term מתדבק in Maimonides' thirteenth Proposition should be taken not in its ordinary sense of 'cohesion', but in the sense of 'eternal duration'.[1] או שרצה באמרו מתדבק, תמיד נצחי. Its corresponding Greek term *συνέχεια* likewise has these two meanings. Aristotle uses it in both of these meanings in one passage in the *Physics*, VIII, vii, § 3 (260 b, 20–21). In the Hebrew translations of the *Physics*, *συνεχῶς* in this passage is in one case rendered by נצחית and in another case by מדובקת.

The definition of time in terms of the duration of motion is not original with Crescas. It has a long history behind it. It was of common usage in post-Aristotelian philosophy among the Stoics and the Neoplatonists, the latter of whom tried to identify it with an ancient view of some of the Pythagoreans. Its traces are also found in the works of many Arabic and Hebrew authors with which Crescas was familiar. Crescas saw clear through the difference between the Aristotelian and the later definitions of time, and has utilized it here for his own purpose. It is due to the unoriginality of his definition, and to his reliance upon the general acquaintance of his contemporaries with the nature of that definition, that Crescas did not think it necessary to enter into an elaborate explanation of its meaning.

[1] This is the correct reading of the passage according to the Vienna, Parma, Munich, Oxford, and Vatican MSS. The Ferrara edition as well as the Paris and Jews' College MSS. read או שרצה באמרו מתדבק, מתדבק תמיד נצחי.

The clearest statement of the definition of time in terms of duration is found in Plotinus. In the *Enneads*, III, 7, 6, he says that among those who define time as a relation of motion, some identify it with *διάστημα*, i. e. the interval or extension of motion. What is meant by that *διάστημα* he does not explain. The Latin translation, however, adds the gloss 'sive spatium, sive durationem'. This gloss is probably based upon the subsequent discussion of the term *διάστημα* by Plotinus himself. In chapter 7 he raises the question what that *διάστημα* might mean, in answer to which he mentions *τοσόνδε*, i. e. quantity, and hence space and *συνέχεια*, i. e. duration.

Plotinus does not mention the name of the author of the un-Aristotelian definition of time. But we gather this information from Simplicius. In one place in his Commentary on the *Categories*, Simplicius informs us that it is Zeno who defines time as the *διάστημα* of motion (cf. Zeller, *Stoics, Epicureans and Sceptics*, ch. VIII, Eng. Tr., p. 197, note 2). In another place, in his Commentary on the *Physics* (cf. Simplicius, *In Aristotelis Physicorum libros commentaria*, ed. Diels, p. 786, l. 11 sqq.; and Taylor's translation of the *Physics*, p. 544). Simplicius mentions the fact that Jamblichus in the first book of his Commentary on the *Categories* quotes Archytas to the effect that 'time ... is a certain number of motion, or the universal extension of the nature of the universe'. A little further in the same passage Simplicius mentions Damascius as the one who interpreted the term 'extension' used by Archytas to mean 'temporal extension', or 'duration'. To quote Simplicius: 'Time is the universal extension of the nature of the universe, because it is not only the extension of motion, but also of rest. . . . And as he proceeds, he

renders it still clearer, that he does not define extension according to magnitude [i.e. space] but according to the duration of the ever'. Cf. *op. cit.*, p. 787, ll. 33–4, and p. 788, ll. 18–20 καθόλου δὲ διάστημα τῆς τοῦ παντὸς φύσεως, ὅτι οὐ μόνης κινήσεως ἀλλὰ καὶ ἠρεμίας . . . καὶ προελθὼν ἔτι σαφέστερον ἐποίησεν, ὅτι οὐ κατὰ μέγεθος ὥρισε τὸ διάστημα, ἀλλὰ κατὰ τὴν τοῦ ἀεὶ συνέχειαν.

Traces of this definition of time are to be found in the works of Arabic authors. In the Encyclopedia of the Brethren of Purity, we find the following statement: 'Time is also said to be the number (عدد) of the movements of the celestial sphere. Or, again, it is said to be a kind of duration (مدّة) which becomes numerically determined by the movement of the celestial sphere'.

وقد قيل انه عدد حركات الفلك وقد قيل انه مدّة تعدّها حركات الفلك.

(Cf. Dieterici, *Die Abhandlungen der Ichwân Eš-Šafâ*, Arabic text, p. 35; German translation, pp. 14–15 of Book V of his series *Die Philosophie der Araber*, &c.). Of these two definitions, it is clear, the first represents the Aristotelian, or rather the Platonic, view, the second the un-Aristotelian.

The un-Aristotelian definition seems to be implied in Avicenna's discussion of time in his *Al-Najat* (Rome, 1593, pp. 30–31) and also in his *Eš-Sefâ*, as may be gathered from Horten's translation of the latter work (cf. Horten, *Die Metaphysik Avicennas*, IV, iii, ch. 4, § 2). The term used by Avicenna in the sense of 'duration' is الاتّصال.

Following Avicenna, Algazali reproduces a similar definition in his *Makasid al-Falasifah, Metaphysics*, IV. He says, 'Time is a term signifying the duration of motion, that is to say, the extension of motion'.

اذ الزمان عبارة عن مدّة الحركة اى عن امتداد الحركة.

(From a copy of MS. Berl. Quet., No. 59 in the possession of Professor Henry Malter.)

The terms 'duration' and 'extension' are differently rendered in the two Hebrew translations which I have consulted. In one (MS. Cambridge University Library, Mm. 8. 24), 'duration', مدّة, is rendered by its Hebrew homophonous term מדת, and 'extension', امتداد, by התפשטות (כי הזמן רמז למדת התנועה ר"ל התפשטות התנועה). In the other (MS. *ibid.*, Mm. 6. 30), مدّة is rendered by עת and امتداد by המשך (כי הזמן מליצה כעת התנועה ר"ל מהמשך התנועה).

The same definition is also reproduced by Sharastani, evidently from the *Al-Najat*, in his summary of Avicenna's philosophy (Cureton's edition, p. 401). 'And so there is here a measure for motions, corresponding to them, and everything corresponding to motions is something having duration, which duration implies a continual renewal of itself. It is this that we call time.'

فاذًا هاهنا مقدار للحركات مطابق لها وكل ما طابق للحركات فهو متّصل ويقتضي الاتّصال متجدّده وهو الذي نسمّيه الزمان.

The term used by Sharastani, which I have translated by 'duration', is الاتّصال, a word which, like the Hebrew התדבקות, used in Crescas's definition, is derived from a root meaning 'to join', 'to cohere', and again, like the Hebrew התדבקות, ordinarily means 'cohesion' or 'continuity'. But in the light of Avicenna's definition of time which is reproduced by Algazali, and by analogy of the Greek *συνέχεια* and the Hebrew התדבקות, I have taken this term here in the sense of 'duration'. Haarbrücker, who translated Sharastani into German, seems to have missed this peculiar meaning of the term and its significance in the definition of time. He consequently takes the term الاتصال in its ordinary sense

of 'cohesion' (*Zusammenhang*), and thus attributes to Sharastani a definition of time as meaningless as would be that of Crescas, if we were to translate the term התדבקות in his definition by 'cohesion'.

This un-Aristotelian definition of time occurs also in the works of the early Jewish philosophers. Saadia defines time as being 'nothing but the measure (or extension) of the duration of bodies' (cf. *Emunot*, II, 11, وكان الزمان انّما هو مدّة بقاء الاجسام, which in Judah Ibn Tibbon's Hebrew translation reads והזמן איננו כי אם מדת קיום הנשמים). The essentially characteristic word in this definition is the term 'duration', for in another place in his work Saadia uses only that term in his definition of time. (Cf. *Emunot*, I, 4, 'Its essence, truly defined, is the duration of these existent objects, &c.' . . . وانّما حقيقته بقاء هذه الموجودات. In this case Judah Ibn Tibbon translates the term بقاء by השארות and not by קיום. . . . אבל אמתתו השארות הנמצאות האלה). Now this definition of time is evidently not Aristotelian, as has already been pointed out by Guttmann (cf. *Die Religionsphilosophie des Saadia*, p. 80), for it lacks the most characteristic expression used in Aristotle's definition of time, namely, its being the number or measure of motion. But Guttmann, as we shall see, is wide of the mark in identifying Saadia's definition as Platonic. He has been led into this error by a superficial reading of a certain passage of Zeller, which he mistook to be an exact reproduction of Plato's definition of time and in which the term 'Dauer' would seem to be the most characteristic feature. (Cf. Zeller, *Phil. d. Gr.*, 2, 1, p. 521, 'Aus diesen Bewegungen der Himmelskörper entspringt die Zeit, welche nichts anderes ist, *als die Dauer ihrer Umläufe*'.) Plato, however, has never given a clean-cut definition of time in which the term 'duration', *διάστημα*

or *συνέχεια*, forms the most important part. It is only from his discussion in the *Timaeus* (37–9) and from the doubtful reference to it in the *Physics* (IV, x, § 7) that we may gather some idea of Plato's conception of time, and from both these sources it appears that the most characteristic feature of his conception of time is its connexion with the movements of the celestial spheres. As to the nature of this connexion, however, it is a matter of controversy among the Greek commentators whether Plato, like Aristotle, considered time to be the measure of the motion of the spheres, or, unlike him, he identified it with the motion itself. (Cf. Simplicius, *op. cit.*, pp. 700–4, and Taylor's translation of the *Physics*, pp. 242–5, n. 4.) It is therefore more reasonable to assume that Saadia follows that un-Aristotelian definition of time which, as we have seen, is characterized by the use of the term 'duration'.

Saadia's definition seems to have been adopted verbally by Abraham bar Ḥiyya. He defines time as ושאיננו כי אם מעמדת הנמצאות [בב"י אמירה אמידת] (cf. *Hegyon ha-Nefesh*, p. 2 a, Leipzig, 1860). By changing the dubious reading of [בב"י אמירה אמידת] to מדת we have a literal Hebrew translation of Saadia's definition of time, in which the term بقاء is rendered by עֲמִדָה. Thus Abraham bar Ḥiyya's definition of time cannot be either Aristotelian or Platonic, contrary to a statement of Husik, according to whom time is defined by Abraham bar Ḥiyya as the measure of motion (cf. *A History of Mediaeval Jewish Philosophy*, p. 115).

We have thus seen that the essential part in the un-Aristotelian definition of time is the term 'extension', in the sense of temporal extension, or 'duration'. In Greek the words used are *διάστημα* and *συνέχεια*. In Arabic for temporal 'extension' Algazali uses امتداد, which is translated

into Hebrew by התפשטות and המשך. For 'duration' we have the following terms: (1) بقاء, used by Saadia, and translated into Hebrew by קיום and השארות (Judah Ibn Tibbon) or by עמדה (Abraham bar Ḥiyya). (2) مدّة, used in the Encyclopedia of the Brethren of Purity and by Algazali, and rendered into Hebrew by מדה and עת. (3) الاتّصال, used by Sharastani and Avicenna, which is the exact equivalent of the Greek *συνέχεια*. The Hebrew for this is התדבקות, and it is this term which is used here by Crescas. In all these definitions of time, as we have seen, the term 'duration' is used either together with the term 'motion' (Plotinus, Arabic authors), or without it (Archytas, Saadia, Abraham bar Ḥiyya). The term 'motion', therefore, is not an essential part of this un-Aristotelian definition. If it is used at all, it is used for some other reason, and not necessarily to the exclusion of 'rest', as will be presently explained. Thus Crescas significantly says in his definition of time that it is the measure of the duration of *motion or of rest* (cf. Simplicius's citation from Damascius quoted above).

Let us now see what the significance of this un-Aristotelian definition is, and how it differs from the Aristotelian definition.

To begin with, these two definitions imply two fundamentally different conceptions with regard to the problem of the reality of time. Aristotle himself, as is well known, raised the question as to the reality of time. His own view on this point amounts to a compromise. Time is partly real and partly ideal. In so far as it is conceived only in connexion with motion it is real, for motion implies the existence of a moving object and a space medium. But in so far as time is not identical with motion, it being

only the measure or number of motion, it is conceptual, for the act of measuring or numbering is mental (cf. *Physics*, IV, ~~xiv~~ xiv). The implication of the un-Aristotelian definition, on the other hand, is that time is purely ideal. We thus find that Crescas, after having stated this definition of time, derives from it the logical conclusion, as follows: 'Consequently it may be inferred that the existence of time is only in the soul' ולזה יראה היות מציאות הזמן בנפש. According to this view time is absolutely independent of motion, magnitude, and space. It could have been conceived by the mind even had there been no external world in existence. We thus again find Crescas contending, as a consequence of his definition of time, that the statement of R. Judah bar R. Simon that the order of time had existed previous to creation (*Bereshit Rabba*, ch. III) should be taken in its literal sense. ולזה יתאמת מאמר ר' יהודה בר רבי סימון כפשוטו והוא מלמד שהיה סדר זמנים קודם לכן (cf. *Moreh*, II, xxx).

But time, in its purely ideal nature, when conceived absolutely apart from motion, is indeterminate and immeasurable. It is an unqualified limitless duration. It does not become a subject of measurement unless it is conceived in connexion with an external moving object. For the existence of an object in motion implies three things: (1) a corporeal magnitude, which is the subject of motion; (2) space, which is the medium of motion and within which one may distinguish the different distances traversed by the subject; (3) the process of motion itself, which is subject to a variation of velocity. And thus when there is an object in motion we are able to obtain a definite portion of time by dividing the distance by the velocity. This does not mean that motion will give

rise to time; it only means that through motion we are enabled to get a part of definite time out of the indefinite duration which has an independent conceptual existence of its own. Time appears to us in its definite proportions only in the ratio of distance and velocity (cf. Sharastani and Algazali, *op. cit.*; and Altabrizi's commentary on Maimonides' Twenty-five Propositions, Prop. XV). Hence Crescas's definition that time is the measure of the duration of motion or rest between two instants.

This difference between the two definitions may be further stated in the terms of the mediaeval scholastic discussion whether time was materially or only formally different from motion (cf. Suarez, *Metaphysicarum Disputationum*, ed. 1614, part II, p. 472 b 'An tempus in re distinguatur a motu'; cf. also *Annotationes* to Duns Scotus's *Quaestiones in Libros Physicorum Aristotelis*, Quaestio XV, ed. Vivès, p. 125. According to Aristotle's definition time is only formally different from motion; materially they are both identical. Or, to put it in the language of Simplicius and Averroes, time and motion are according to Aristotle the same in subject (*ὑποκειμένῳ* = בנושא) but different in definition (*λόγῳ* = במאמר). Cf. Simplicius, *op. cit.* IV, 11, p. 712, ll. 18–19 *ἀλλὰ κἂν τῷ ὑποκειμένῳ ταὐτὰ ᾖ, τῷ λόγῳ διαφέρει.* Just as five things are in their subject wood, but they are five according to number, so are time and motion. Their common subject is the moving object. When we view this object with reference to its motion between co-subsistent prior and posterior points in space we get pure motion. But when we view it with reference to successive prior and posterior points which are not in space, we get time. According to the definition adopted by Crescas, on the other hand, time and motion are

materially different. In order to exist, time, unlike motion, does not imply the existence of an object in space. Its existence is purely conceptual. In order to be measured, however, this requires the existence of an object moving in space; for definite time is obtained by the division of distance by velocity.

That these two definitions revolve, as I have been trying to show, about the problem of the reality of time, is clearly brought out in two passages of Algazali and Averroes. As we have already seen, Algazali defines time in terms of 'duration'. Averroes, of course, follows Aristotle. Now, in his *Hapalat ha-Pilusuphim*, I, Algazali makes the following statement: 'Passing by itself is time; passing on account of something else is motion, for motion passes by virtue of the passing of time.' העובר בעצמותו הוא הזמן, והעובר בזולתו הוא התנועה, כי היא תעבור בעבור הזמן. To this Averroes replies in his *Hapalat ha-Hapalah*, I, as follows: 'What he says is true enough, and, indeed, it proves the truth of what we have said about the nature of time. Certain it is, however, that the 'before' and the 'after' of time include at once their respective parts of motion as well as their respective parts of duration, not merely their respective parts of duration. This is in opposition to Algazali' (quoted in Narboni's Commentary on Algazali's *Kawanot*, Metaphysics, IV, (MS. Paris, Bibl. Nationale, Cod. Heb. 901):

ואמר בן רשד בהפלת ההפלה, כי זה שאמרו מבואר בעצמו, וזה באמת מעיד על אמתת מה שבארנוהו. ואמנם הקודם והמתאחר מן הזמן יכללו באמת חלקי התנועה עם חלקי ההמשך יחד, לא חלקי ההמשך לבד. וזה בחלוף אבוחאמד.

The point at issue between Algazali and Averroes is clear. To the former, time is abstract duration, materially

differing from motion. Hence it is ideal. To the latter, time is materially identical with motion. It is therefore in so far real. In another passage, quoted by Narboni in his Commentary on the *Moreh*, Part II, Proposition XV, Averroes makes his point still clearer. He says that while time must always involve motion, pure duration, conceived without motion may be termed 'eternity':

ואמר בן רשד, זה לשונו: הזמן מליצה מהמשך מציאות למציאות המתנועעות, ולכן לא יצויר הזמן אלא עם התנועה, והנצח, הוא דהר בערב, מליצה מהמשך מציאות הנמצאות הבלתי מתנועעות, ולכן יאמר באלו שאינם בזמן. וירצה אמנם כי הזמן לקוח מצד בחינת נושא ההמשך שהוא התנועה, ובכלל התנועה, מצד שהיא נלקחת, והמשכה; כי הוא המשך התנועה אשר במתנועע הראשון, הכולל לכל הנמצאות המתנועעות ומשתנות בו, בשנוי המוקף במקוף, כי אנחנו משתנים מפני שאנחנו במציאות משתנה. והנצח לקוח מצד בחינת המשך מציאות מופשט, והוא דמות זמן, לא אמתת זמן. כי אין ספק שהנבדלים נמצאים תמיד ונמשך מציאותם, אך לא יתואר בזמן, כי אין מטבעם התנועה אשר הזמן נמשך לה, ואין בזמן מציאותם, אחר שהזמן הוא בהיותם השמים אשר מציאותם בם. 'Said Averroes, and we quote him verbatim: "Time is an appellative term for the duration of the existence of such objects as have motion. Consequently time cannot be conceived but in connexion with motion. Eternity—*dahr* in Arabic—is an appellation for the duration of things that are immovable. Hence immovable beings are said to have no existence in time." By this he means to say that time is to be taken with reference to the *subject of duration*, which is *motion*, and that it must be implicated in that motion, with reference to which it is taken, and the duration thereof—for time is the duration of the motion of the first movable [sphere] which comprehends all other objects and through which all those objects are moved and changed in the same manner as an object enclosed within another object is said to change through the change of

the object enclosing, for we do all change because we exist within something changing. Eternity, however, is to be taken with reference to *abstract duration*. It has the semblance of time, but is not real time. Thus while there can be no doubt that the immaterial intelligences continue for ever and have duration, they cannot have the predication of time, inasmuch as their nature precludes motion with which time must be related. Their existence therefore is not in time, since to be in time means to partake in the motion of the heavens in which things have their existence.' (Cf. also De Boer, *Die Widersprüche der Philosophie nach al-Gazzali*, pp. 23–5.)

The same contrast between the Aristotelian and un-Aristotelian definition of time is again brought out by Narboni in his Commentary on the *Kawanot*, Metaphysics, IV, where he compares Avicenna's and Algazali's views with that of Averroes:

אמנם אבוחאמד ואבן סינא לא לקחו המספר אשר אמרו אריסטו מקום מספר חלקי התנועה, אבל מספר חלקי המשך אשר לשלמות הראשון. ולזה אמר ששרש ההמשכות שרש הזמן, ר"ל, סוגי מבלי הכנס הנושא בו, וזה להבדל טבע הזמן מטבע התנועה במאמר, ר"ל, בנדר, ר"ל מצד חלופו בנושא ג"כ, אם הוא נמשך לו, אבל לא שיכנס בו. וזה בחלוף בן רשד. כי בן רשד מודה, כי המשך והתפשטות מציאות התנועה היומית הוא אמתת הזמן, רק כי הוא יחשוב שהוא צודת הזמן לא כללות זמן, וזה כי לפי שבן רשד, הזמן כמו שאמרנו הוא שעור התנועה . . .

'Algazali and Avicenna, however, do not take the term "number" used by Aristotle in the sense of the number of the parts of motion, but as the number of duration which is of the nature of a primary entelechy. He thus says that the essence of duration is the essence of time, that is to say, they have a generic identity without implying a common

subject [i.e. motion]; and this follows as a consequence from the view that the nature of time differs from that of motion in expression, i.e. in definition, as well as in subject. Though motion bears some relation to time, it is not part of it. This is in contradistinction to Averroes's view. For while Averroes admits that the duration and extension of the diurnal motion [of the sphere] is the essence of time, he considers that to be only the form of time but not the whole of it [i.e. they are related in form, not in substance]. According to Averroes, as we have pointed out, time is the measure of motion, &c.'

In adopting this un-Aristotelian definition of time Crescas has therefore attained his main purpose, namely, the absolute separation of time from motion. The main characteristic of this definition, as has been shown, is the identification of time with pure duration. Motion comes in only as a means of measuring off a definite part of time, and for this rest may do as well as motion. The full significance of this definition has not always been fully understood. Isaac Ibn Shem-tob (fifteenth century), who like his nephew Shem-tob ben Joseph Ibn Shem-tob, the well-known commentator on the *Moreh*, makes several disparaging remarks about Crescas in his super commentary on Averroes's *Intermediate Physics*, missed the main point of this definition. Taking Crescas's definition to differ from that of Aristotle only in the addition of the term 'rest', he argues as follows: Since rest is only the negation of motion, by defining time in terms of rest, it still logically implies the existence of motion. Isaac Ibn Shem-tob does not explicitly mention the name of Crescas in this particular instance. He refers to him only as a 'certain scholar from among the philosophers'. It is clear, however, that he

refers there to Crescas, whom he names and criticizes in other parts of the same work:

ועוד יש למספק שיספק שיאמר שאחר שאריסטוטלוס אומר בפרק הבא אחר זה שהזמן משער למנוחה בציורו לתנועה השוה לה, למה זה ועל מה זה לא אמר בעדרו אריסטו מספר התנועה והמנוחה . . . . . ונאמר בהתרת הספק הכ"ת, שכבר בארנו בהתרת הספק שעבר שאינו נמצא אמתת זמן במנוחה [. . . "זמן הוא קנין ומנוחה הוא העדר . . . . ויהיה א"כ העדר הקנין משער להעדר באמצעות ציורנו דבר נמצא"] . . . . . ואחר שזה כן אי"א שנאמר שיהיה ראוי שתלקח המנוחה בנדר הזמן כמו שכבר חשב חכם אחד כן החוקרים בזה המקום.[2]

The discussion of time in Arabic and Jewish philosophic literature, as here outlined, may prove to be of some historical significance. In it we already find all the problems about the nature of time that are discussed at length by the later Scholastics—the problem as to the definition of time, whether it should be in terms of motion or in terms of pure succession, as to its reality, and as to the nature of its distinction from motion. We have seen how all these problems are interdependent. It is interesting to note that the Scholastics have not always seen this interdependence of the problems. Furthermore, Crescas's definition of time and its historical background may throw light upon Spinoza's discussion of the same problem. Spinoza, as is well known, distinguishes between time and

[2] From an unpublished work in the Cambridge University Library, Mm. 6. 25. This work I have found to be identical with the anonymous commentary on Averroes's *Intermediate Physics* in Munich, Cod. Heb. 45. Steinschneider ascribed the latter work to Isaac Albalag (*Uebersetzungen*, § 49), which can be disproved independently by internal evidence. In connexion with Isaac Ibn Shem-tob I may also state that I have proofs which conclusively show that he is the author of the three commentaries on the *Physics* found in Trinity College, Cambridge, R. 8. 19, which are described by both Schiller-Szinessy and Steinschneider as anonymous (cf. *Uebersetzungen*, § 52 c).

'duration'. Duration is indefinite time. Time is only one of the 'modes of thinking, or rather of imagining' (*cogitandi, seu potius imaginandi, modos*), to measure off a definite portion of time (cf. *Epistola*, XII, *olim* XXIX). Without misprizing the originality of Spinoza's conception of time and eternity as a whole, it can be shown that he is freely operating with terms and ideas of long standing in the Jewish philosophic literature. To students of Bergson, too, it may perhaps be of some interest to compare his distinction between 'pure duration' and 'mixed time' with the implications of the two contrasting definitions of time which we have discussed.

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NOTES ON PROOFS OF THE EXISTENCE OF GOD IN JEWISH PHILOSOPHY

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OF THE MANY HISTORICAL PROOFS for the existence of God—the three from speculative reason enumerated by Kant, the cosmological, the ontological, and the teleological, and others like universal assent and the innateness of the idea of God—only the cosmological type of argument was pressed into service by Jewish theologians. The arguments from universal assent and the innateness of the idea of God were omitted for very good reasons, and the argument from design, though not overlooked completely, was not used as an independent proof for the existence of God. As for the ontological argument, an eminent scholar to the contrary notwithstanding, it is entirely absent, though some of the ingredients of which it is made up were not unknown, as, for instance, the identity of essence and existence in God which is the basis of the ontological proof as given by Spinoza. Of these general remarks, which summarize the situation, the discussion which follows is an enlargement.

It was Kaufmann who invited us to be astounded at the failure of our religious thinkers to turn to account, as did Christian and Moslem theologians, the ancient, classical argument of universal assent.[1] When we scrutinize, however, the nature of that argument and all it implies, instead of being surprized at their remissness we shall have to admire their circumspection. The argument from universal assent, it might

[1] *Attributenlehre*, p. 2, n. 4.

be said, reflects a polytheistic background of religious belief, or, at best, a stage in the development of the conception of divine unity which is sometimes described by the term henotheism. In a religious tradition where the recognition of one spiritual deity as supreme did not mean the branding of all others as false, there was indeed a certain cogency in the argument from universal assent, for all mankind, to be sure, acknowledged the existence of some kind of god. It was thus well for Roman Cicero[2] to declare that all men had an idea of god and prove thereby his existence. It was thus also with the heathen converts to Christianity and Islam when they began to prove the existence of the Jewish God by arguments taken from classical philosophy. When Jewish theologians, however, in the tenth century, found it necessary to prove the existence of God, the situation was entirely different. They were called upon to prove the existence of a God who in the consciousness of his believers was the only true God, besides whom all the other gods were vain and false idols. It was hardly possible for them to appeal to the general persuasion of mankind as to His existence. To them, quite the contrary, mankind denied the existence of God, and it was only by a special act of grace that a single chosen people had come to know him by means of a direct revelation. It was therefore not to a universal assent that Jewish philosophers appealed but rather to a national assent, or tradition, as they call it, a tradition based upon the evidence of a direct experience shared by the entire race at the foot of Sinai. The argument from tradition, it might therefore be said, is the Jewish equivalent of the classical argument from assent. I hope to show elsewhere, that in Anselm, too, we may identify under the guise of tradition the argument from assent and thus prove that his famous ontological proof was only meant to be considered as ancillary to the proof of *consensus gentium*.

No more inexplicable is another difficulty, again raised by Kaufmann, as to the failure of Jewish theologians to present the argument of the innateness of the idea of God in the

[2] *De Natura Deorum* II. 4.

human mind as proof for His existence.[3] The term innate idea is used in two senses. It is sometimes used in a rather loose and general sense merely as the denial of an external, sensible source to certain ideas, assigning to them, however, some external, super-sensible source. In this sense, Plato's theory of reminiscence, which ascribes to knowledge an external, super-sensible source, is often spoken of as a theory of innate ideas.[4] But the term is also used in the more specific sense of knowledge coming entirely from within, as something constitutional with the mind, having no external source whatsoever, sensible or super-sensible. In this sense it was that Cicero conceived of innate ideas of which the idea of God he declared to be one.[5] Now, taken in the first sense, Jewish philosophers did not fail to mention that the idea of God might be innate in man. The knowledge of God arrived at by revelation or through prophetic insight, the basis of tradition, may be said to represent knowledge of that kind. When Maimonides, for instance, declares that the knowledge of the existence of God may be obtained either by demonstrative reasoning or by direct revelation,[6] this revealed idea of God may be called innate in the same sense as the awakened memories of Plato. Taken in the second sense, however, God as an innate idea, to be sure, was not urged by Jewish philosophers as a proof for His existence, and for the very good reason that in their theory of knowledge innate ideas of this kind had no existence. Characteristic of the theory of knowledge commonly held by Jewish philosophers, to whatever school of thought they might otherwise belong, is its essential empiricism. Not that they were empiricists in the sense that all knowledge was to be derived from sensuous experience, but in the sense that it had to be acquired from *without* and could never rise from *within*. The external sources of knowledge were either the impressions of the external world upon the senses or the operation of some

3 *Attributenlehre*, p. 2, n. 4.

4 See, for instance, Janet and Sérailles, *A History of the Problems of Philosophy*, I. 82.

5 *De Natura Deorum* II. 4.

6 *Moreh Nebukim* II. 33.

immaterial agency, as the Active Intellect, for instance, upon the human mind.

That this is the general character of the theory of knowledge held in common by Jewish philosophers may be gathered from their respective classifications of the sources of knowledge. There is a uniformity of principle underlying all these classifications which unmistakably betokens a common origin. Whatever difference they display is rather in the use of terms and in the manner of arrangement, which, however, can all be reduced to a common type.

Saadia enumerates four sources of knowledge:[7] (1) Sense perception. (2) Knowledge of reason,[8] by which he means, to judge from Bahya's paraphrase of this expression, the self-evident truths, the first principles, ἀρχαί, and the immediate propositions, πρότασις ἄμεσος, of Aristotle. (3) Necessitated knowledge,[9] i. e., knowledge by logical inference. (4) Tradition.

Bahya's classification is somewhat vague in its preliminary statement.[10] But subsequent explanatory remarks, which occur in the course of his discussion, render it quite clear. It resembles Saadia's classification in its main outline. Saadia's first three classes are reduced to two, the antithesis of knowledge of the senses and knowledge of reason.[11] Sensible knowledge is then

7 *Emunot ve-Deot*, Introduction.

8 Saadia calls it מדע השכל the equivalent of which in Bahya's classification is שהוא משיג הדברים המושכלים בעצמו (see below note 13). The fact that Saadia illustrates it by such judgments as that truth is good and a lie is horrid, שהצדק טוב והכזב מנונה, does by no means limit this kind of knowledge to judgments of value only. It is rather two examples taken at random. The immediate propositions (πρότασις ἄμεσος, *Anal. Post.* I. 2, 72a, 7) of Aristotle include all the self-evident truths of mathematics, logic, physics, metaphysics, and ethics. Algazali, in his *Makasid al-Falasifah* I. 51–58, enumerates thirteen kinds of immediate propositions among which are included such judgments of value as given here by Saadia, illustrated by the same example of a lie being horrid, الكذب قبيح (p. 55). He describes such judgments as "general opinions", المشهورات, המפורסמות (see below note 20).

9 מדע הברחית. Joseph ibn Zaddik, however, uses this term to designate direct knowledge in general. See quotation below in note 19. (Cf. Brüll's JJGL IV. 137.)

10 *Hobot ha-Lebabot* I. 10.

11 *Ibid.* האחד מהם הרגשותינו הנשמיים . . . והשני בדרך שכלנו.

subdivided into perceptions of the external senses and representations of the internal senses.[12] Knowledge of reason is subdivided, after the manner of Saadia, into primary notions and logical inference.[13] His classification therefore runs as follows: (1) Sensible knowledge, subdivided into (a) perceptions and (b) representations. Rational knowledge, subdivided into (a) primary notions and (b) inferences. (3) Traditions.

Judah ha-Levi, in his general treatment of the soul,[14] follows Bahya in his main classification, dividing knowledge, barring tradition, into sensible and rational.[15] The former he subdivides into (a) the perceptions of the five external senses, and (b) the representations formed by the common sense out of material furnished by the external senses. Such representations are the common sensibles, τὰ κοινά, such as figure, number, size, motion, rest.[16] Rational knowledge he subdivides, like Bahya, into (a) primary notions and (b) logical inferences.[17]

The contrasts between sensible and rational, direct and indirect knowledge cross each other in Joseph ibn Zaddik's classification. He divides knowledge, first, into (a) sensible and (b) rational,[18] and, then, into (a) necessitated, by which he means, unlike Saadia, any kind of direct knowledge be it

[12] *Ibid.* ויתבאר אצלך מענין החושים הנשמים אשר זכרנו והחושים הנפשיים.

[13] *Ibid.* וכן נאמר בשכל שהוא משיג הדברים המושכלים בעצמו ובדרך הראיות.

[14] *Cuzari* V. 12.

[15] *Ibid.* This formal division may be inferred from the following statement: זה היוצא לנו מדברי האנשים האלה במה שלמטה מהנפש המדברת. ואמרו במדברת וכו'.

[16] *Ibid.* החושים החמשה ידועים, ומושניהם ידועים, באמצעותם [ובאמצעות ההרגשה המשתתפת] תושג הדמות והמנין והגודל והתנועה והמנוחה. התבאר מצוא ההרגשה המשתתפת מאשר אנחנו דנין על הדבש, דרך משל, כשנראהו, שהוא מתוק. That the term באמצעותם does not mean that the five senses are the sole and direct means whereby the "common sensibles" are perceived may be gathered from *De Anima* III. 1, 425a, 14 seq. and II. 6, 418a, 17–19. Hence the bracketed remark within the quotation.

[17] *Ibid.* ויהיו בו הצורות המושכלות, אם בלמוד אלהי ואם בקנין. ואשר הם בלמוד הם המושכלות הראשונות, אשר ישתתפו בהם כל בני אדם אשר על המנהג הטבעי, ואשר בקנין הם בהקשה ובחדוש המופתי.

[18] *Olam Katan* I. 1. האדם ישיג המושגות בשני ענינים, האחד בהרגש והאחר בשכל.

sensible or rational, and (b) logical inference.[19] Necessitated knowledge is subdivided by him into four kinds: (a) sense perceptions, (b) general opinions, (c) traditions, and (d) primary notions.[20] In addition, he mentions also the knowledge of spiritual beings which the soul perceives immediately.[21]

Like Joseph ibn Zaddik, Maimonides contrasts in a general way direct knowledge with knowledge by logical inference.[22] Of direct knowledge he gives us two classifications, which are mutually complementary. One is to be found in te *Millot ha-Higgayon,*[23] where it is divided into (a) perceptions, (b) primary notions, (c) general opinions, and (d) traditions. The other, in the *Moreh Nebukim,*[24] has the following divisions: (a) primary notions, (b) perceptions, and (c) and what is almost as nearly evident as perceptions. By this he undoubtedly means the "common sensibles" mentioned by Judah ha-Levi. He describes it as follows: "Such are the existence of motion, of man's free will, of phases of production and destruction, and of the natural properties of things perceived by the senses, e. g., the heat of fire, the coldness of water, and many other similar things."

This is a well-night exhaustive list of the sources of knowledge enumerated by the most representative Jewish philosophers. Now, which of these kinds of knowledge could by any show of reason be claimed as innate? Some scholars are inclined

19 *Ibid.* ונדבק לענין זה מה שראוי לו במדע ההכרח ומדע הראיה . . . המדע המוכרחי, אשר הוא מוכרח לאדם להודות אותו ולא יוכל לכפור אותו . . . . נאמר עתה כי המדע המופתי והוא מדע הראיה . . . . הוא בנוי על המדע המוכרחי. Cf. above note 9.

20 *Ibid.* הנה עתה מיני הדברים המושכלים בעצמם ארבעה מינים, מורגשות ומפורסמות ומקובלות ומושכלות ראשונות. All these four kinds of immediate sources of knowledge are included among the thirteen immediate propositions enumerated by Algazali. See above note 8.

21 *Ibid.* אבל הדברים הרוחניים תשינם הנפש החכמה בעצמה בלא אמצעי שום דבר, לפי שהוא דומה להם ברוחניות ובדבקות.

22 See, e. g., *Moreh Nebukim* II. 33, where המפורסמות והמקובלות are contrasted with המושכלות. The term המושכלות is the equivalent of what he describes previously as כל מה שיודע בסופת אמנם שאר הדברות הם מכת המפורסמות והמקובלות לא מכת המושכלות.

23 Chapter 8.

24 Part I, Chapter 51.

to take the primary notions as kind of innate knowledge. Thus Kaufmann identifies Saadia's knowledge of reason with innate ideas.[25] Friedländer translates Maimonides' מושכלות ראשונות by "innate notions".[26] Neither of these, however, is right.

First, with regard to Saadia's knowledge of reason. There are two parallel classifications in the philosophic encyclopedia of the Brethren of Purity which would seem to throw light upon the nature of this kind of knowledge. One of these passages tries to explain knowledge of reason as the knowledge which Plato held to be attainable through an awakening of the slumbering ideas by means of reflexion and throught.[27] The other passage simply describes it in the general familiar terms in which are usually described the functions of Aristotle's *sensus communis* and of Avicenna's internal senses.[28] However that many be, knowledge of reason cannot be innate. Even Platonic recollections are not innate ideas in the strict sense of the term, for while indeed they are not derived from perception they are still derived from an external source, namely, the world of pure ideas.[29]

Second, with regard to the "primary notions". The term מושכלות ראשונות, "primary notions", would seem to be a translation of Galen's ἀρχαὶ λογικαί and are akin to Aristotle's ἀρχαί and to the προλήψεις and κοιναὶ ἔννοαι of the Stoics. None of these are known to be innate[30] in the strict Ciceronian sense

[25] *Attributenlehre*, p. 3, n. 3.

[26] *Guide of the Perplexed* I. 51.

[27] Cf. Dieterici, *Die Anthropologie der Araber im X. Jahrhundert*, p. 40 "Die Form der Dinge wird im Wesen und die Bedeutung alles Vorhandenen wird uns in der Substanz der Seele klar. Sie ist die Fundgrube der Wissenschaft und die Stätte der Formen, wie Plato sagt, daß alle Wissenschaft in der Seele der Kraft nach sei; wenn du über ihr Wesen nachdenkst und es erkennst, so sind alle Wissenschaften in ihr durch die Vernunft."

[28] Cf. Dieterici, *Die Lehre von der Weltseele bei den Arabern im X. Jahrhundert*, 38. "Oder zweitens durch die Vernunftkraft, das ist durch Nachdenken Anschauung, Verständnis, Unterscheidung, richtige Vermutung und klaren Scharfsinn." This passage is referred to by Kaufmann evidently to prove that by knowledge of reason is meant innate ideas.

[29] Cf. Zeller, *Eclecticism*, 159; Windelband, *A History of Philosophy*, 119.

[30] Zeller, *Aristotle*, I. 200–203, *Stoics, Epicureans and Sceptics*, 79–80,

of the term. Furthermore, in the discussion of the nature of the primary notions by early Jewish philosophers, it is generally assumed that they have an external source, albeit a supersensible external source. Thus both Judah ha-Levi and Abraham ibn Daud ascribe them to divine inspiration.[31] But to say that they are divinely inspired is simply another way of saying that they are acquired from *without* and consequently are not innate.

The existence of innate ideas of the Ciceronian type was thus unknown to the Jewish philosophers. They could not therefore be expected to argue that God was such an innate idea.

The argument from design, which is ascribed to Socrates by both Xenophon[32] and Plato[33] and was also used by Cicero,[34] is not altogether absent in Jewish philosophy. But it was used for purposes other than to prove the existence of God. It was used either as a reinforcement of the cosmological argument from creation or as evidence of divine goodness, unity, intelligence, and the like, after existence had already been demonstrated on some other ground. Bahya introduces the argument from design as a refutation of those who "had maintained that the world came into being by accident".[35] The allusion is no doubt to the Epicurean view,[36] which, while

Ecclecticism, 159, 363; Ritter, *The History of Ancient Philosophy*, III. 59; Grote, *Aristotle*, I. 256, 369–371.

31 Cf. *Cuzari* V. 12, quoted above in note 17, and *Emunah Ramah* II. iv. 1. p. 58. וכמו אלה המשפטים הנקראים ראשונים, המניעים בהתעוררות אלהי, בלי מחשבה ועיון. See also p. 60.

32 *Memorabilia* IV. 3.

33 *Phaedo* 96 seq.

34 *De Natura Deorum* II. 5.

35 *Hobot ha-Lebabot* I. 6. ויש בני אדם שאמרו שהעולם נהיה במקרה מבלי בורא שהתחילו ויוצר שיצרו. The commentary *Marpe la-Nefesh, ad loc.* explains it: שאמרו שהעולם קדמון, which, of course is wrong. See Azriel's *Ezrat Adonai*, p. 2. ואם תאמר שלא כיון בבריאותו, א"כ היתה העולם במקרה, וכל דבר הבא במקרה אין לו סדר, ואנו רואים כי הנבראים יש להם סדר, ועל סדר הם מתקיימים ועל סדר הם מתבטלים ועל סדר הם מתחדשים.

36 Cf. Lucretius, *De Rerum Natura* V. 416–431; *Emunot ve-Deot* I. 3 על מי שחשב מן הראשונים — רמוז בזה על אפיקורוס; והדעת התשיעי דעת המקרה, *Moreh Nebukim* II. 20, and Narboni *ad loc.*

admitting a temporal beginning of the world, denied the existence of a Creator, explaining the origin of the world as the result of the interaction of blind mechanical forces. The argument is thus used by a Bahya in conjunction with creation; in no way does he attempt to prove thereby the existence of God if the world were assumed to be eternal. Likewise Judah ha-Levi[37] makes the argument dependent upon creation, proving thereby, after having shown that the world was created and that consequently there must be a Creator, that creation was an act of wisdom and will and justice and not merely that of blind chance and accident. Averroes and Maimonides, too, use design as evidence of divine knowledge, unity, and the purposiveness of creation.[38] Joseph Albo puts the situation in a nutshell when he says something to the effect that the act of creation itself proves the existence of God; the fact that creation was performed after a certain manner proves that it was an act of purpose and forethought.[39] Thus when Kant argues that the "physico-theological" proof must rest upon some other proof, his argument can hardly be used as a criticism of Jewish philosophers, for they have never used design as an independent proof.

The absence of the ontological proof in Jewish philosophy was called in question by Guttmann who believes to have found it foreshadowed in Abraham ibn Daud.[40] His belief, however, would seem to be based upon a rather loose interpretation of the Avicennean type of the cosmological proof. He seems to think that the crux of Avicenna's argument is the contention that an absolutely necessary being must have existence involved in its essence. That this is not so is quite evident from all the texts which produce Avicenna's proof.

37 *Cuzari* III. 11, and V. 20.

38 Cf. *Happalat ha-Happalah,* Disputation IV (MS. Bodleian 1354) שהסדר אשר בעולם יראה ממנו שהמנהיג לו אחד, כמו שהסדר אשר בצבא יראה שהמנהיג לו אחד והוא שר הצבא, and *Moreh Nebubim* II. 20.

39 *Ikkarim* II. 4. ממה שנוכר שם יציאת הדברים מן הכח אל הפועל יש ראיה על מציאות הפועל המוציא אותם אל הפועל, וממה שנוכר מיציאתם אל הפועל בזמנים מתחלפים, והם ששת ימי בראשות, יש ראיה על מציאות הפועל בכונה ורצון.

40 Cf. *Die Religionsphilosophie des Abraham ibn Daud aus Toledo,* p. 121.

Avicenna's argument from possibility, like Aristotle's argument from motion, is grounded upon the view that any series of causes and effects must somehow come to an end. It simply argues to the effect that given a series of caused causes, i. e., possible beings, it cannot go on to infinity, and must therefore end at an uncaused cause, i. e., an absolutely necessary being. That absolutely necessary being, to be sure, must have existence involved in its essence, but this identity of essence and existence follows only as an inference from its nature as an uncaused cause.[41] In fact, Algazali questions the validity of that inference, contending that the proof whereby the existence of an uncaused cause is established warrants only the denial of external causation and does not necessarily exclude a logical distinction of essence and existence in its nature.[42] Guttmann cites the following passage from Abraham ibn Daud in support of his view. והנמצא, אשר מציאותו מחוייב, עצמותו מספיק במציאות עצמותו. He seems to take the term עצמות in this passage in the technical sense of "essence", as the equivalent of מהות and the opposite of מציאות, "existence". He thus renders the meaning of the passage as follows: "Ein Wesen von Nothwendiger Existenz, sagt A. b. D., ist ein solches, in dessen Wesen schon die Existenz seines Wesens inbegriffen ist". But עצמותו here is simply a reflexive pronoun, the passage simply aiming to assert that an absolutely necessary being cannot have a prior cause but must be the cause of itself. Of course, the idea of an uncaused cause whose essence involves existence was later made by Spinoza the basis of his ontological proof. But neither Avicenna nor any of his Jewish followers tried to prove the existence of that uncaused cause ontologically; they all proved it cosmologically.

It is the cosmological argument, therefore, based upon the principle of causality, that became the standard proof of the existence of God in Jewish philosophy. There it is found to

[41] See *Moreh Nebukim* I. 57, אמנם מי שאין סבה למציאותו, והוא השם יתעלה, ויתרומם לבדו, כי זה הוא ענין אמרנו עליו יתעלה שהוא מחוייב המציאות, תהיה מציאותו עצמו ואמתתו ועצמו מציאותו.

[42] See JQR N. S. VII. 25ff.

have undergone three stages of development. The first may be called the Platonic; the second is the Aristotelian; the third is associated with the name of Hasdai Crescas.

The cosmological proof in its first stage is known in Jewish literature as the proof from creation. The existence of God is made a corollary to the creation of the world. Prove that the world came into being and, by the principle that every thing that comes into being must have a cause, you conclude that there is a God. It is essentially the same as Plato's proof from efficient causation,[43] though the relation between these two proofs does not seem to have been generally known. Maimonides as well as Averroes speaks of it as something invented by the Mutakallimun and entirely unknown to the ancients.[44] Moses Narboni, however, distinctly recognized its Platonic origin.[45] The popularity of this type of cosmological argument, the readiness with which it was generally accepted, was due to the fact that it chimed in with the traditional method of reasoning which had come down from the Scriptures. To argue from the fact that the world had come into existence to the existence of a Creator was simply to translate into a syllogistic formula the first verse of the book of Genesis or to rationalize the emotional appeal of the Prophets to look up into heaven and ask who had created it all. It is thus that for a long time this argument passed for the standard proof of the existence of God and God's existence was made dependent upon a belief in a created world. This indirect method of proving the existence of God is followed by Saadia,[46]

43 *Timaeus* 28.

44 See *Happalat, ha-Happaiah*, Disputation I, ולכן מי שהשתדל מזה חצד קיום הפועל הנה הוא מאמר ספוקי הלצי נצוחי לא מופתי. ואם יחשב כאבונצר ובן סיני שהם הלכו בזה חדרך בקיום שכל פעל יש לו פועל והוא דרך לא דרכו בה הקודמים ואמנם נמשכו שני אלה האנשים בו אל המדברים מאנשי אמונתנו, and *Moreh Nebukim* I. 74 end. אלו הם אמתות דרכי המדברים בקיום הדוש העולם, וכאשר תתקיים אצלם באלו הראיות שהעולם מחודש יתחייב בהכרח שיש לו פועל חדשו בכונה ורצון וחדוש.

45 Commentary on *Moreh Nebukim* II. 2, הנה רבינו משה רמז הנה על המחלוקת אשר בין כת אפלטון וכת ארסטו', כי אפלטון שיאמין בחדוש יצטרך בהכרח להניח לעולם פועל עושה חדשו.

46 *Emunot ve-Deot* I. 2.

Bahya,[47] Judah ha-Levi[48] in his restatement of philosophy, and Joseph ibn Zaddik.[49] It should be further noted that the proof from creation was made to rest upon the theory of creation in general and not necessarily upon *creatio ex nihilo*.[50] In this it had retained its original Platonic character. Crescas was quick enough to take Maimonides up on this point and build around it his criticism, when the latter attempted to make use of this proof.[51]

The Platonic stage of the cosmological argument, as we have seen, is based upon two principles. First, the principle of causality, the assertion that nothing can change or come into existence without a cause. Second, the principle that the world did come into existence. With the denial of a created universe by Aristotle, the argument enters upon its second stage. The first principle of causality is still retained, but the second principle of creation is replaced by the principle denying the possibility of an infinite regress. In Jewish philosophic literature, the cosmological argument in its second stage occurs under three forms. One is couched in terms of motion, another in terms of potentiality and actuality, and a third in terms of possibility and necessity. The first of these is Aristotle's argument from motion given in the eighth book of the *Physics*, to which we shall hereafter refer as the first proof from motion. The second may be likewise traced to Aristotle.[52] The third is associated with the name of Avicenna, although it is also

47 *Hobot ha-Lebabot* I. 4—6.

48 *Cuzari* II. 50 and V. 18.

49 *Olam Katan* III (p. 49, ed. Horovitz).

50 In Saadia this point is clearly brought out. He first proves creation in general, whence he derives the existence of God, and then proceeds to prove that creation must have been *ex nihilo*. The others likewise proceed immediately from creation in general to the existence of God.

51 Cf. *Or Adonai* I. 11. 20. שאם היה הוה ונפסד, ועוד שלא יתחייב מהחלוקה שיהיה מתהוה אחר הפסד ברדך שנצטרך למציא, וזה שכבר אפשר, שיהיה הוה ונפסד בהמשכות כענין באישי המין. Crescas, as he very often does, has left out here the most essential point of his argument. But his criticism would have been entirely unwarranted, if the argument from creation had assumed *creatio ex nihilo*.

52 Cf. *Metaphysics* IX. 8. 1049b, 24 seq. and XII. 7. 1072b, 3 seq.

found in Alfarabi.[53] All these three arguments are in fact only different forms of one and the same argument. They are all based upon the two principles mentioned above, causality and the impossibility of an infinite regress. Motion, potentiality, and possibility are all forms of causality and they are in a way interchangeable terms. In Greek the same term δύναμις means both potentiality and possibility, and Aristotle defines motion as the actuality of that which is potential so far as it is potential[54] and also as the actuality of that which is movable so far as it is movable.[55] A hybrid form of the cosmological proof, made up of the Platonic principle of creation and of the Aristotelian principle as to the impossibility of an infinite regress, is to be found in Bahya.[56]

In addition to the argument from motion already mentioned, Aristotle has another argument, also based upon motion, but without involving the principle of infinity. It may best be described in the words of Gomperz as a postulate of logical symmetry.[57] From the fact that there are things which are moved but do not move, and there are things which both move and are moved, he infers that there must be something which moves but is not moved.[58] This argument, too, has found its place in Jewish philosophy, and together with the previous three forms of the Aristotelian cosmological proof makes up Maimonides' four proofs for the existence of God.[59]

The literary treatment of these proofs in Jewish philosophic texts might become an interesting subject of investigation in a comprehensive study of the proofs of the existence of God. But even in such a summary sketch as this it will not be altogether out of place to discuss at some length the different

53 Guttmann, *Die Religionsphilosophie des Abraham ibn Daud aus Toledo*, p. 120.

54 *Physics* III. 1. 201a, 10—11.

55 *Physics* III. 2. 202a, 7—8.

56 *Hobot ha-Lebabot* I. 5.

57 *Greek Thinkers* IV. 219.

58 Cf. *Metaphysics* XII. 7. 1072a, 20, *Physics* VIII. 5. 256b, 23; *De Anima* III. 10. 433b, 13.

59 *Moreh Nebukim* II. 1

usages made by Abraham ibn Daud and Maimonides of Aristotle's two proofs from motion. Abraham ibn Daud it was who for the first time introduced the second stage of the cosmological proof in Jewish philosophy. It his work it is found in two of its forms, motion and possibility.[60] He has also reproduced Aristotle's second argument from motion, although with a slight verbal modification;[61] but, curiously enough, unlike Maimonides, he does not employ it as a proof for the existence of God. He uses it only to prove the immovability of the Intelligences. The question naturally arises, why did not Abraham ibn Daud use the second proof from motion as a proof for the existence of God?

It will be rather difficult to answer this question properly without having to turn for a while from the main read of our inquiry and into some of its intricate byways. The philosophy we are here considering now is a close-knit system and it is well-nigh impossible to probe a single point and not be obliged to overhaul the entire structure. It is often the despair of the student to find an effective way of isolating a problem without having to wander far off into devious directions to trace the paths where its roots lie concealed. Perhaps, the best and most economic way of attacking our present problem would be to preface the discussion by a few general remarks.

There is, to begin with, the controversy with regard to the relation of God to the Intelligences and the celestial spheres with which many names are associated but which we shall present here under the names of its two chief exponents, Averroes and Avicenna.[62] According to Averroes, God is one of the many Intelligences which preside each over its respective sphere. He is the Intelligence of the outermost, all-encompassing, inerratic sphere, the first heaven, so called. He

[60] *Emunah Ramah* II. 1, pp. 47—48.

[61] *Op. cit.* II. iv. 2, p. 61, הנה במציאות שלשה מיני מניעים: אחד מהם מניע יניע מבלתי ידיעה, כמו מניע האבן אל המטה. והמין השני מניע בידיעה והוא עם זה מתנועע. . . . . והמין השלישי מניע יניע מבלי שיתנועע.

[62] Moses ha-Lavi in his *Ma'amar Elohi* (MS. Bodleian 1324. 5) alligns on the side of Avicenna also Alexander Aphrodisiensis, Themistius and Alfarabi. He himself joins this group. See also *Or Adonai* IV. 12.

moves that sphere directly in the same manner as the other Intelligences move their own respective spheres, as a final cause as well as an efficient and formal cause, and it is through this motion, which God imparts directly to the outermost sphere, that He becomes the mover of the entire universe. He differs from the other Intelligences only by reason of His priority in degree and importance, being the cause of the Intelligences not only but also of the spheres, all of which proceed from Him simultaneously and not by way of succession, one from the other. On all these points Avicenna has entirely different views. God, according to him, is a being beyond the Intelligences. He does not move directly any of the spheres, but as a remote cause He may be said to be the mover of the universe in so far as He is the object of desire and thought of all the Intelligences. The proximate cause of the motion of the outermost sphere is an Intelligence, who is an emanation from God, the first and only emanation from God; all the other Intelligences and spheres proceed from that first Intelligence by way of succession, one from another.[63] It may be said that after a manner Avicenna conceives God as a transcendent being, Averroes conceives Him as an immanent being.

Then there is a second point. Both Avicenna and Averroes agree that the Intelligences are not moved reciprocally and accidentally by the spheres in which they produce motion. Though in a general sense the Intelligences constitute an internal principle of motion in the spheres analogous to the soul in living beings, still, unlike souls, they receive no accidental motion in return, and this because of the peculiar relation the Intelligences bear to the spheres. Avicenna explains their relation as that of the Active Intellect to the human mind.[64] Moses Narboni, speaking for Averroes, explains it after the manner of the relation of the Acquired Intellect to man in Maimonides's psychology.[65]

[63] See commentaries on *Moreh Nebukim* II. 1. 4, 22, especially Shem-Tob.

[64] See Horten, *Die Metaphysik Avicennas*, 593. "Daher besitzt also jede Sphäre einen unkörperlichen, für sich bestehenden Geist, der sich zu ihrer Seele verhält, wie der aktive Intellekt zu unserer Seele."

[65] See Narboni on *Moreh Nebukim* II, Introduction, Proposition XI. כ

A third point is a follows. The divergent views of Avicenna and Averroes were meant to be interpretations of Aristotle's discussion of the First Mover. The controversy is therefore sometimes reduced to the question whether Aristotle's arguments from motion, whereby he proves the existence of a first immovable mover, was meant to prove the existence of God or was only meant to prove the existence of an immovable first Intelligence who is not God. According to Avicenna, the immovable First Mover which, in *Metaphysics* XII. 7, Aristotle identifies with God is not the immovable first mover the existence of which he establishes by his arguments from motion. The latter is only the first Intelligence.[66] It will be noted in that in *Physics* VIII Aristotle never explicitly identified his elicited first mover with God. According to Averroes, identifying as he does the Intelligence of the first sphere with God, the proofs from motion naturally constitute proofs for the existence of God.

Finally, as a result of this interpretation of Aristotle, Avicenna makes no use of the arguments from motion as proofs of the existence of God but invented in their stead the argument from possibility and necessity. Furthermore, the Avicenneans are rather chary of the use of the expression first mover as a designation of God inasmuch as according to their interpretation the term in its more rigid sense is used by Aristotle

השכל זה ענינו שהוא נקשר עם הגלגל הקשר צורה נפרדת, ר"ל הקשר מציאות לא עירוב, ואיננו מתנועע במקרה. וככה השכל הנקודה [הנקנה] לפי דעת רבינו משה אשר חבר שיחסו לאדם יחס השכל הנבדל אל איש העולם.

66 See Moses ha-Lavi, *Ma'amar Elohi.* מאמר אלהי לחכם הפילוסוף האלהי משה ב"ר יוסף הלאוי, בקיום שמניע הגלגל האחרון עלול מהסבה הראשונה יתּ. אמר ירחמנו האל, הכונה בזה המאמר בקיום מציאות הסבה הראשונה וסתירה מי שטעה בזה . . . והביא המופת על שהוא זולת המניע הראשון, ושהמניע הראשון עלול לו . . . הפילוסוף מקיים מציאות מניע ראשון בשמיני מהשמע . . . . אבל הוא מביא שמה מופת רק על מציאות מניע ראשון ולא עלה בחקירתו אל סבת המניע הראשון והוא דּ' See also remark of Isaac Albalag in his commentary on Alazali's *Makasid* II, quoted by Steinschneider in his *Übersetzungen*, p. 116, note 61 ואני זה כמה ימים לא זוכי מלעיין בס' השמע, ולא מצאתי ראיות אריסטו מבוארות לא למציאות מניע ראשון אינו נוף ולא כח בנוף, אבל לא אמנם נתבאר שם אם הוא האלוה או זולתו and Shem-Tob on *Morch Nebukim* I. 69. כפי דעת הרב הלקוח מדברי ב"ם באלשפ"א ואלנ"ני, לא מה שהתנוהו שרשי אריסטו אשר האמין כי המניע הראשון אינו האלוה, כי זה לא יניע הגלגל.

as a designation of the First Intelligence. More frequently do they designate God by the expressions First Cause, סבה ראשונה, and Necessary Existent, מחוייב המציאות.

Now, both Abraham ibn Daud and Maimonides are followers of Avicenna with regard to the transcendency of God and the process of emanation. They differ, however, as to the immovability of the Intelligences and it is here that the reason for the different usages they make of the second argument from motion is to be found.

Abraham ibn Daud leaves us in no doubt as to his belief in the immovability of the Intelligences Agnia and again he states with great precision and with much emphasis that the Intelligences are as immovable as God himself.[67] He explains the reason for their immovability in terms used by Avicenna, namely, that they are related to the spheres after the manner of the Active Intellect to the human mind.[68] This together with his Avicennean conception of a God transcending the Intelligences would naturally make it impossible for him to use the second argument from motion as a proof for the existence of God. The argument, as may be recalled, established only the existence of an immovable mover, but, according to Abraham ibn Daud, the Intelligences are no less immovable than God.

If, however, Abraham ibn Daud was justified in not using the second argument from motion as a proof for the existence of God, how then could he use as such the first argument from motion? That argument, too, establishes only the existence of an immovable mover which to him must not necessarily be God. Neither Avicenna nor Averroes claim anything more for it. If Averroes makes it a proof for the existence of God, it is only because he identifies God with the Intelligence of

[67] *Emunah Ramah* II. iv. 2, p. 62. ולשואל שישאל ויאמר, כבר הסכימו האנשים על שהמניע אשר לא יתנועע אחד, ועתה יאמרו שלנפש כל רקיע מניע לא יתנועע, א"כ המניעים אשר לא יתנועעו רבים — והתשובה שהאנשים אמנם סברו שהמניע הראשון אשר לא יתנועע הוא אחד, וזה האחדות שב אל הראשון, לא אל אשר לא יתנועע, אבל העצמים אשר לא יתנועעו רבים מסודרים, כמו שנשמי השמים מסודרים. See also pp. 64, 66, 68.

[68] *Emunah Ramah* II. iv. 2, p. 62. ובכאן עצמים פשוטים מדרגתם מן העצמים אשר הם לשמים כמו (הנפשות), מדרגת השכל הפועל אל הנפש האנושית.

the outermost sphere. But Abraham ibn Daud stretches the argument to prove the existence of a first mover which he identifies with Avicenna's Necessary Existent, calling the Intelligence of the outermost sphere a second mover, as may be inferred from his statement that the second Intelligence is a third mover.[69] Now, it must be admitted that Aristotle's first proof from motion could be easily modified and made to prove the existence of Avicenna's God. Maimonides, as we shall presently see, did so modify it. Nor would it be impossible to discover traces of such a modification in Abraham ibn Daud's restatement of the argument, or, better still, to read into it some new meaning. Nowhere, however, does he give us the slightest hint or suggestion of a conscious effort to justify his position. It is well to acclaim Abraham ibn Daud as the first to introduce the proof from motion in Jewish philosophy, but was he justified in doing so? Does he speak the language of a pioneer whose innovations, when unaccompanied by a statement of reasons and explanations, would only tend to land him in a maze of inconsistencies? All this would seem to point to the conclusion that Abraham ibn Daud was blindly following a certain literary source, unknown to me at the present writing, where the application of the argument from motion as a proof of the existence of the Avicennean God was fully and satisfactorily accounted for.

The case of Maimonides is much clearer. He uses both the first and the second arguments from motion as proofs for the existence of Avicenna's God, and he does so without involving himself in any inconsistencies, owing to his particular theory of the movability of the Intelligences.

Maimonides happens to be of the opinion, in which he seems to be alone, that the Intelligences have accidental motion. He conceives the Intelligences to be related to the sphere neither as the Active Intellect to the human mind nor as the Acquired Intellect to the human body. The Intelligences are indivisible forces within the spheres as is the hylic intellect in the human body, as a result of which they are moved accident-

[69] *Emunah Ramah* II. iv. 3, p. 64. ואחר כן זה היציאה יציאה ראשונה מן הראשון ית' וית' הוא נ"כ במאמרם מניע לא יתנועע ,ויצא ממנו מניע שלישי לא יתנועע.

ally. It is this theory, which he states elsewhere,[70] that makes him say, in his discussion of his first proof, as follows: "As for the fourth case, namely, that the [ultimate] mover of the sphere be an indivisible force residing in it in the same manner as the human soul resides in man, it is likewise impossible that this mover alone, even though indivisible, should be the cause of the perpetual motion. For if this were its first mover [*par excellence*], that mover would have an accidental motion."[71] Again says he: "It is inadmissible that the Intelligence which moves the uppermost sphere should be the Necessary Existent."[72] He therefore concludes that the first immovable mover which is identified with God is not the proximate motive agent of the outermost sphere but rather the remote and final cause: "And this is God, praised be His name, that is to say, the First Cause which moves the sphere."[73] It is this First Cause of motion, the only immovable mover, whose relation to the world is described by Maimonides after the analogy of the relation of the Acquired Intellect to the human body.[74]

Thus Maimonides' reason for converting Aristotle's proofs from motion into proofs for the existence of Avicenna's God

[70] *Moreh Nebukim* I. 72. ויהיה דמיון הכח הדברי כשכלי הנלנלים אשר בנופות. Cf. Narboni on *Moreh Nebukim* II, Introduction, Proposition XI, ואשר צריך שתדעהו שכל זה הביאו אליו למה שחשב הרב . . . כי השכל הוא כח בנוף, רק בלתי מתפשם, כענין בשכל האדם, ולפי שהוא כח בנוף יתנועע במקרה.

[71] *Moreh Nebukim* II. 1, First Proof. Maimonides seems to be using the term "first mover" מניע ראשון in two senses. First, specifically with reference to God, as in the following passage: יתחייב בהכרח שימצא מניע לא יתנועע כלל וזהו המניע הראשון. (*Moreh Nebukim* II. 1, Second Proof.) Second, in the general sense of an internal principle of motion, as in the following passages: והחום הטבעי הניעתהו הצורה [=הנפש החיונית] אשר בו והוא המניע הראשון. (*Ibid.*, First Proof. See Munk, *Guide*, II. 30, n. 4. Friedländer's note 5, on p. 12, is quite off the mark.) והנפש היא המניע הראשון בעצם . . . . . יתחייב אם כן שתהיה למניע ההוא הראשון סבה אחרת בהכרח חוא מן הכלל המורכב ממניע וממתנועע . . . . ולואת הסבה לא ינועו נופות בעלי חיים תמיד ואף על פי שבכל אחד מהם מניע ראשון. (*Ibid.*) Hence the bracketed additions within the translation of the passage quoted in the text.

[72] *Moreh Nebukim* II. 4.

[73] *Moreh Nebukim* II. 1, First Proof.

[74] *Moreh Nebukim* I. 72. ודע שראוי היה שנדמה יחס האלוה יתי לעולם יחס השכל הנקנה הנאצל לאדם אשר אינו כח בנוף והוא נבדל מן הנוף הברל אמתי ושופע עליו.

is quite clear. But the question may now be raised, was Maimonides justified in transforming the argument of Aristotle in the face of the declaration by both Avicenna and Averroes that it was meant to prove only the existence of an immovable Intelligence of the outermost sphere? Or, to put in other words, is Maimonides' restatement of Aristotle's first proof from motion a perversion of the original Aristotelian proof or is it a legitimate interpretation thereof? The object of my subsequent remarks is to show that Maimonides was fully justified in setting his new construction on Aristotle's argument and that it was fully warranted by the original text of the eighth book of the *Physics*.

Aristotle's first argument from motion aims to prove two things: First, that there is a first mover. Second, that the first mover is immovable. The first point is proved by the denial of an infinite regress; the second point is based on the eternity of motion. The successive stages of the argument are as follows. It begins with the proposition that everything which is moved is moved by something else *externally*.[75] As this, however, cannot go on infinitely, it is concluded that there must be something which is first moved without being moved by anything else *externally*.[76] This marks the end of the first part of the argument, and in the seventh book of the *Physics*, assuming that book to be Aristotelian, Aristotle stops at that. In the eighth book, however, the argument is carried on further. For what the argument has thus far established is the fact that in a series of *mota* and *moventia* we must ultimately arrive, owing to the impossibility of an infinite regress, at a *motum* which has not external *movens* and which must, however, have an internal *movens*. Or, in other words, the argument at this point has shown that the outermost sphere must be a self-moving body, its moving agent being an inner principle, related to the body of the sphere, in a general way, after the analogy of the soul to the body of living beings. This inner principle of motion is what Aristotle calls the first mover. But here a

75 Cf. *Physics* VII. 1, 241b, 24, and VIII. 4, 256a, 2–3.

76 *Op. cit.* VII. 1. 242a, 19–20, and VIII. 5. 257a, 17–21.

new question comes up. Motion, according to Aristotle, is eternal, and eternal motion cannot be explained except on the assumption of a first mover who is absolutely immovable.[77] Now, in living beings, says Aristotle, the internal moving principle, namely, the soul, while immovable *per se*, is moved *per accidens* by the motion of the body.[78] The first mover, however, he argues, cannot be like that; it must be absolutely immovable, inasmuch as the motion it produces is eternal.[79]

With this statement of facts, Aristotle terminates his argument. We are thus left to ourselves to draw our own conclusions. All we have to guide us are the following three statements: (1) There is a first mover. (2) The soul of living beings is moved accidentally. (3) The first mover, unlike the soul, must be absolutely immovable. When we attempt, however, to draw the conclusion, we are confronted with the possibility of two interpretations. According to one possible interpretation, Aristotle's three statements might be connected as follows: (1) There is a first mover, namely, the Intelligence of the first sphere, who is related to the sphere, in a general sense, as the soul is related to the body. (2) Though the soul of living beings is moved accidentally, (3) still the first mover, namely, the Intelligence, is absolutely immovable, because its specific relation to the sphere is like that of the Active or Acquired Intellect to man. According to another possible interpretation, the three statements would be connected as follows: (1) There is a first mover, namely, the Intelligence of the first sphere, who is related to the sphere, specifically, as the hylic intellect is related to man. (2) Inasmuch as the soul of living beings, including the hylic intellect of man, is moved accidentally, (3) consequently, the first mover, who must be absolutely immovable, cannot he the Intelligence of the first sphere, but must be something transcendent. The interpretation of Aristotle will thus depend upon the view one happens to hold with regard to the movability of the Intelligences. Maimo-

77 *Op. cit.* VIII. 6. 258b, 10–12.
78 *Op. cit.* VIII. 6. 259b, 16–20.
79 *Op. cit.* VIII. 6. 259b, 20 seq.

nides, therefore, believing as he did in the movability of the Intelligences—a view which is closely bound up with a particular phase in his system of psychology—was justified in following the second interpretation and prove by Aristotle's first argument from motion the existence of Avicenna's transcendent God.

It would take us too far afield to treat here, with all the fullness it deserves, of the third stage of the development of the cosmological proof ushered in by Crescas. The present writer hopes to submit the result of his studies on this subject in a work entitled *Crescas's Critique of Aristotle and Maimonides*. But it would seem fitting to conclude this concatenation of notes on the proofs of the existence of God with an observation on the historical confusion displayed in a statement by Spinoza as to the development of the cosmological proof. Spinoza, speaking with approval of Crescas's elimination of the impossibility of an infinite regress from the cosmological proof, expresses himself this wise: "But I should like first to observe here, that the later Peripatetics have, I think, misunderstood the proof given by the ancients who sought to demonstrate the existence of God. This, as I find it in a certain Jew named Rabbi Chasdai, runs as follows."[80] The implication of this passage is that the cosmological proof as given by the ancients, that is, Aristotle, was vitiated by the later Peripatetics, that is, the mediaeval Aristotelians, but was restored to its pristine, genuine form by Rabbi Chasdai. This is not exactly what we know of the history of the proof. Fritz Mauthner wisely remarks in a recent publication: "Spinoza und Kant (von Sokrates and Platon nicht zu reden) wußten wenig von der Geschichte der Philosophie."[81]

80 Epistola XII (olim XXIX).

81 *Spinoza*, p. 24, Dresden 1921.

The Classification of Sciences in Medieval Jewish Philosophy

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THE CLASSIFICATION OF SCIENCES IN MEDIAEVAL JEWISH PHILOSOPHY

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BETWEEN THE TWO TYPES of classification of sciences traditionally attributed to Plato and Aristotle the basic differences are to be found in the general scheme of the classification as well as in the inclusion and omission of certain sciences. In the so-called Aristotelian classification all the sciences are divided into three main classes, theoretical, θεωρητική, practical, πρακτική, and productive, ποιητική[1], or—as the last is better known by its mediaeval designation—*ars mechanica*. The theoretical is subdivided into physics, mathematics and metaphysics;[2] the practical into politics, economics and ethics.[3] The mathematics of Aristotle's classification was again subdivided by Ammonius Hermiae into arithmetic, geometry, astronomy and music[4]—a fourfold classification which was generally adopted and was known among the Schoolmen as the *quadrivium*. Logic is excluded from this scheme of classification, being considered only as an instrument and as auxiliary to all the other sciences. The classification which is identified with the name of Plato differs from this classification in the following respects. It does not mention the distinction between the theoretical and practical science; it does not number mathematics among the sciences; it includes logic as a co-ordinate science, which, however, it uses in the more general sense of dialectics and as synonymous with metaphysics. The Platonic classification thus falls into three parts: logic, physics and ethics.[5]

[1] *Metaphysics* VI, 1, 1025b, 25.
[2] *Op. cit.*, 1026a, 19.
[3] *Ethics* VI, 9, 1142a, 9–10. See Zeller: *Aristotle* I, p. 186.
[4] See Zeller: *Op. cit.*, p. 181, n. 1.
[5] See Zeller: *Plato*, p. 164.

When we attempt, however, to determine whether any given mediaeval classification of sciences is Aristotelian or Platonic, the task is not so easy. Very often, because of the omission of the general terms distinguishing between the auxiliary, theoretical, and practical sciences, the classification appears as a co-ordinate arrangement of the specific sciences. In a classification which is truly Aristotelian we may, therefore, get a list of sciences among which logic will appear to be included. Again, some lists are only partial and incomplete, thus lacking the characteristic features by which the basis of the classiffication may be determined. Furthermore the original Aristotelian classiffication is sometimes amplified by the additional subdivision of certain sciences into their specific branches, or by the introduction of new religious and practical sciences not found in the original scheme, so that the character of the nuclear classification is lost among the excrescences. Finally, the confusion is sometimes increased by the rearrangement of the parts of the classification, or by the substitution of some specific branches for the general science to which they belong, as, for instance, astronomy for mathematics. Thus in any attempt at determining the basis of a classification all these factors must be taken into consideration. On the whole, the use of logic as a co-ordinate science or the omission of the distinction between theoretical and practical is by itself no proof of a Platonic influence; but, on the other hand, the inclusion of mathematics and the restrictive use of the term logic, or the enumeration of both logic and metaphysics, will be an infallible proof for an Aristotelian origin of any given classification.

Through the translation of Johannes Philoponus' commentary on Porphyry's *Isagoge* the Aristotelian classification was introduced into Arabic philosophy where it became the basis of all the classifications of science.[6] It is the underlying scheme of Alfarabi's classification,[7] though the distinction between

[6] See Grabmann: *Die Geschichte der Scholastischen Methode* II, p. 30.

[7] See Steinschneider: *Die Hebraeischen Uebersetzungen des Mittelalters*, p. 44, n. 7b; Clemens Baeumker: *Alfarabi, Ueber den Ursprung der Wissenschaften (De Ortu Sciantiarum)*; Carra de Vaux: *Farabi* in Hastings' *Encyclopedia of Religion and Ethics*, V, pp. 557–8; T. J. De Boer: *Philosophy (Muslim)*, *Ibid.* IX, p. 880.

theoretical, practical and auxiliary is omitted and new religious and linguistic sciences are added. It is literally taken over by Avicenna,[8] Algazali[9] and Averroes.[10]

Slightly modified, but still Aristotelian in principle, is the classification given in the Encyclopedia of the Ihwan al-Safa. This classification is of signal importance for our purpose, as it contains most of the characteristic features which we shall notice in the classifications of Jewish philosophers. Laying out the plan of their encyclopedia after the manner of the French Encyclopedists, the Ihwan al-Safa divide the knowledge of their time into two classes, practical arts (الصنائع العمليّة) and theoretical art (الصنائع العلميّة).[11] Under theoretical the authors include three main divisions:[12] (1) Propaedeutic (الرياضيّة) or literary (الاداب) sciences, such as reading, and writing, etc. (2) Sciences of religious law (النواميس), and (3) purely philosophical sciences (الفلسفيّة الحقيقيّة). Omitting the first two as irrelevant for our purpose, we find under purely philosophical sciences four subdivisions: (1) Mathematics, designated by the same name of propaedeutic (الرياضيّات),

[8] See the following quotation from the Hebrew translation of his *Al-Shafa* published in *Ozar Nehmad* II, pp. 114–115:

חלקי החכמות שלשה. חכמה העליונה, והיא חכמת ענינים אין דבקות להם בחומר, והיא החכמה האלהית. והחכמה התחתונה, והיא חכמת ענינים הם בחומר, והם עם זה בחומר נראים, והיא חכמה הטבעית. וזאת החכמה תחייב העיון בכל הדברים אשר להם חמרים נראים ובכל המקרים אשר להם. ובכאן חכמה אמצעית, יש לה חלקים שבעה, וקצתם חזק היחס לחכמה האלהית, וקצתם חזק היחס לחכמה הטבעית, וזאת היא החכמה הלמודית. וחלקיה: המספר, והחשבורת, והמוסיקא, והמשקלות, והמדות, והמבטים, והתכונה. והנה חכמת המספר (ושאר) חכמת דברים אין המציאות לה שתהיה בחומר, אבל הנה יקרה לה וישינה שתמצא בחומר במוחלט ולא נראית, והשכל ישולל אותה מן החומר שלילה אמתית, ולכן יש לה יחס לחכמה האלהית מאד. וחכמת החשבורת חכמת דברים אפשר שידומו זולת החומר כמו שחשב, אם כי במציאות דקות השכל ישיג השגה אמתית שהיא לא תהיה כי אם בחומר, אבל היא לא חומר נראה. וחכמת המוסיקא והמשקולת והמדות והמבטים כלם חכמת דברים הם בחומר, ויהיה לאחת על אחת יתרון בקרוב אל החכמה הטבעית והרוחק ממנה, והמזג ביניהם הרבה או מעט. והנה חכמת התכונה מזינה מטבעית ולמודית, ונושאה הגדול שבכל חלקי החכמה הטבעית ונשואה למודית.

[9] *Makasid al-Falasifah* II, pp. 76–79.

[10] At the beginning of his *Epitome of the Metaphysics*. See Horten: *Die Metaphysik des Averroes*, pp. 1–9.

[11] Dieterici: *Die Logik und Psychologie der Araber*, p. 1; Arabic text, *Idem*: *Die Abhandlungen der Ichwân Es-Safâ*, p. 239.

[12] *Ibid.* p. 10ff. Arabic text, *op. cit.*, p. 246ff.

(2) logic, (3) physics, and (3) theology, each of these being again subdivided into special branches. Theology has five such branches, the fourth of which is described as the science of government (السياسة) and is again subdivided into five parts of which the last three correspond to Aristotle's politics, economics and ethics.

This classification has been characterized as un-Aristotelian,[13] but a closer observation of the plan will reveal that what we have here is really the Aristotelian scheme with certain common modifications the like of which we also find among Aristotle's commentators and the Schoolmen. The distinction between practical and theoretical is easily recognized as Aristotelian. But the Ihwan al Safa use here practical, عمليّة not in the sense of πρακτική but rather in the sense of productive, ποιητική. Such a merging of the terms "practical" and "productive" is also found among the commentators and the Schoolmen.[14] Having thus used up "practical" for the "productive", they place Aristotle's "practical", i. e., politics, economics, and ethics, under theology. This, too. was a common practice among the Schoolmen.[15] By omitting the general terms distinguishing between the theoretical, practical and auxiliary, logic is thus made a co-ordinate branch of the philosophical sciences. There is no need of assuming a Platonic influence, for logic is used here in a strictly Aristotelian sense and the topics enumerated under it are all taken from Aristotle's writings.

The classifications in Jewish philosophical literature follow on the whole the Arabic models and are consequently Aristotelian in principle. Such classifications occur with great frqeuency in Jewish literature.[16] Some of them are formal statements,

[13] See Carra de Vaux: *Philosophy* (*Muslim*) in Hastings' *Enc. of Rel. and Eth.*, IX, p. 880.

[14] See Grabmann: *Die Geschichte der Scholastischen Methode* II, p. 30; Robert Flint: *Philosophy as Scientia Scientarum*, p. 90.

[15] See Flint: *Ibid.*

[16] For "classification of sciences" we have in Hebrew the following expressions: (1) מספר החכמות (Falaquera in *Reshit Hokmah* and Moses da Rieti. See below n. 73) from Alfarabi's احصا العلوم.

others are casual remarks, still others are only indirect implications. The observations which follow are based on a varied collection of sources which, while not complete, is large and representative enough to serve as a basis for a study of the classification of the sciences in Jewish philosophical literature.

One of the earliest classifications is found in Isaac Israeli's introduction to his commentary on the *Sefer Yezirah*.[17] The practical sciences are entirely omitted nor is the distinction between theoretical and practical mentioned, but, dealing only with the theoretical, which is called the "science of philosophy" (חכמת פילוסופיא), he divides it into the three conventional parts of the Aristotelian tradition. Here, again, the general terms mathematics, physics, and theology are omitted, but each is represented by some of the specific sciences which usually go under the main division. Thus for mathematics the quadrivium is given, for physics, medicine is specified, and for theology in general, the science of the unity of God and of the spiritual beings is particularly mentioned.

The term used here for "medicine" will prove of some interest. The passage reads חכמת הטבעים, כלומר חכמת הרפואות. Graetz, who ascribes this commentary to Dunash ibn Tamim, takes the term טבעים in its ordinary sense of "physics", and understands the passage to enumerate "physics" and "medicine" as two

(2) סוגי החכמות (Abraham Shalom, See n. 63). Similarly Ihwan al-Safa: اجناس العلوم (*Op cit.*, p. 246).

(3) מיני החכמות (Abba Mari and Zerahiah Hen. See n. 61 and 72). Similarly Ihwan al-Safa: وانواع تلك الاجناس (*Ibid.*).

(4) חלקי החכמות (Israeli, Avicenna and Bahya: اقسام. See n. 17, 8 and 29).

(5) חלוק החכמות تقسيم العلوم (Algazali: *Makasid al-Falasifah* II, p. 75).

(6) מעלות החכמה (Judah ben Barzilai. See n. 30).

[17] See quotation in *Orient, Litteraturblatt.* 1845, p. 562:
אלא למי שהוא בקי בחכמת פילוסופיא ואפני חלקיה השלשה, אשר תחלתם חכמת החשבון, חכמת ההנדסה, וחכמת הגלגל, וחכמת החבור, כלומר המוצקי. ואחריו החכמה השנית, והיא חכמת הטבעים, כלומר הרפואות. ואחר כך ידע את החכמה השלישית, והיא חכמת היחוד להקב"ה והעניינים הרוחנים.

separate sciences.[18] The word כלומר, however, makes it clear that חכמת הרפואות is an explanation of חכמת הטבעים. While it is not impossible that in Hebrew, as in other languages, the term "physics" has been used here in the sense of "medicine",[18a] still another explanation of this passage may be suggested. It would seem that the term טבע is not to be taken here as the equivalent of the Arabic طبع but rather of طب, and one is tempted to change the reading טבעים to טיבים. In the Arabic classifications, علم الطب stands for "medicine" and is translated into Hebrew by חכמת הרפואה.[19]

While in this passage Israeli does not give the general term for "mathematics", the deficiency is supplied by him in another passage, where he says of music that "it is the best and last of the four branches of the sciences of טורח": והוא המעולה שבארבעה חכמת הטורח[20]. The meaning of the term טורח has escaped the knowledge of Rappoport and Dukes who rendered it by "Turkey". But Michael Jehiel Sachs has pointed out the incorrectness of the translation, and Senior Sachs has inferred its real meaning from the context, without, however, attempting to explain its etymology.[21] The word טורח would seem to be like הרגל, שמוש and מוסר, which we shall meet in the sequel, a Hebrew translation of the Arabic رياضّى, "propaedeutic", which, as we have already seen, is used for mathematics. The Arabic root means "to exercise"; the Hebrew root טרח simiarly means "to exert oneself". All these terms are translations of the Greek προπαιδεία, *preparatory training* (or rather of παιδεία, without the proposition), which Plato applies to mathematics.[22] It is the interpolation

[18] See *Geschichte der Juden*, 4th ed., vol. V, p. 330.

[18a] Thus Maimonides describes medicine as being based on טבע המציאות (See *Pirush ha-Mishnah*: *Pesahim*, ch. 4).

[19] See *Makasid al-Falasifah* II, p. 78. See below n. 137.

[20] See *Kerem Hemed* VIII, p. 64.

[21] *Ibid.*

[22] *Republic* VII, 536D. The Hebrew הלטודים for mathematics has a different etymology. It is a literal translation of تعليم-*μάθημα*. Cf. Steinschneider: *Al-Farabi*, p. 32, n. 32. Reifmann's conjecture that לטודי is a later substitution by Samuel ibn Tibbon for שמושי, הרגלי and מוסרי is wrong (See *Ozar ha-Sifrut* II, p. 48). Samuel ibn Tibbon himself only says that

of a Platonic term in classifications which are basically Aristotelian.

Another classification belonging to the same period is that of David Al-Mukammas, quoted by Judah ben Barzilai (Al-Barceloni) in his commentary on *Sefer Yezirah*.[23] It starts out with what would at first sight seem to be the conventional Aristotelian distinction between theoretical (חכמה ומדע) and practical (אומנות או מעשה). Upon a closer observation, however, it becomes apparent that like the Ihwan al-Safa he substitutes Aristotle's productive, or what may be called applied, science, for practical. He thus says that every science, say geometry, may be either a science (מדע) or an art (אומנות). For this illustration, too, there is a parallel in the Encyclopedia of the Ihwan al-Safa where mathematics is said to be divided into sensible (حسّيّة) and rational (عقليّة), the former leading to the practical arts and the latter to the theoretical.[24]

Taking up the theoretical, Al-Mukammas divides it into three parts. The first and the last correspond to Aristotle's theology and physics respectively. The second, which we would expect to be mathematics, is described in the following terms: והמעלה האמצעית חכמת המוסר והשכל המאמצת דעות בני אדם והמנהגת להם דרך הבינה. As the term מוסר generally means "ethics", the statement in translation would read as follows: "And the middle grade is the science of ethics and of the mind which streng-

למודים is synonymous with שמושים and הרגלים (See *Pirush meha-Millot Zorot*, under למודים.

[23] *Pirush Sefer Yezirah le-Rabbi Judah b. Barzilai*, Berlin 1885, p. 65: וכתב דוד הבבלי כך: הוי יודע כי נדר החכמה הוא מדע יושר הנמצאות, לעמוד על סוף מחקרם, והיא נחלקת לשני חלקים. יש ממנה מה שסוף מחקרו הוא המדע, ועל דעת הוכן הנמצא ויושר תבניתו יעמוד המחקר ודיו; זהו הנקרא חכמה ומדע. ויש ממנה שסוף בקשתם ואחרית מחקרם הוא מעשה ומלאכה ומציאת דבר לעין, וזה נקרא אומנות או מעשה. ותראה מזה טשל בחכמת המדה והמשקל הנקרא בלשון ערבי הנדסה ובלשן יוני גומטריה.... וחמצא חכמה זו בענין הזה עת מתפרדת למדע ואומנות. וכן כל שאר והחכמות. ומשם אמר כי החכמה נפרדת למדע ולמעשה. והמדע נחלקת לשלש מעלות: המעלה הראשונה מדע העליון, הנקרא מדע האלהי, והיא החכמה המשובחת להבין יחודו של הב"ה, וחכמת תורתו ומצותיו, והוא הנבוה והמעולה מכל החכמות. והמעלה האמצעית חכמת דמוסר והשכל המאמצת דעות בני אדם והמנהגת להם דרך הבינה. והמעלה השלישית המדע השפל והתחתון, והוא מדע דרך היצורים ותוכן הנבראים.

[24] Dieterici: *Die Propaedeutik der Araber*, p. 24. Arabic text, *Idem*: *Die Abhandlungen der Ichwân Es-Safâ*, p. 293.

thens the opinions of men and guides them in the path of understanding". Both the use of the term מוסר and the description by which it is followed would seem to point to ethics as the middle science, and this is the general understanding of the passage.[25] But taken in this sense, the classification would be thrown out of the framework of both the Platonic and the Aristotelian schemes, which would seem rather strange. An attempt must therefore be made to cast it in one of the traditional forms of classification, and to this end two alternative solutions may be proposed:

First, leaving the term מוסר in the sense of "ethics", we may take the term שכל in the sense of "logic".[26] That שכל could be a Hebrew rendering of the Arabic المنطق, λογική, like מבטא, דבור, and הגיון, is quite clear, for all these terms mean "reason" as well as "speech". In fact, according to Samuel ibn Tibbon the proper designation for logic should have been מלאכת השכל.[26a] The "middle" science would thus be the "science of ethics and of logic". The description which follows may equally apply to both these sciences. The threefold classification would thus in reality be a fourfold classification, containing theology, ethics, logic, and physics. Such a fourfold classification was not unknown among the Aristotelians and is based upon the classification of Aristotle's writings.[27]

Second, the term מוסר, despite its ordinary meaning of ethics, may be another Hebrew translation of the Arabic رياضّى, "propaedeutic", i. e., mathematics.[27a] In the *Cuzari* the term

[25] Cf. Kaufmann: *Die Theologie des Bachja Ibn Pakuda* in *Gesammelte Schriften* II, p. 21–22, note; Bernfeld: *Da'at Elohim*, p. 136.

[26] This is how Husik takes it. See *A History of Mediaeval Jewish Philosophy*, p. 18.

[26a] See *Pirush meha -Millot Zorot* under הגיון: ולפי דעתי היה ראוי לקראה מלאכת השכל.

[27] See Zeller: *Aristotle* I, p. 181, n. 1.

[27a] Reifmann takes the passage to refer to mathematics, but, puzzled by the use of the term מוסר, he changes the reading of חכמת המוסר והשכל to חכמה המישרת להשכל. See *Ozar ha-Sifrut* II, p. 50. It is interesting to note that the Hebrew מוסר usually translates the Arabic ادب (See Steinschneider: *Uebersetzungen*, p. 350) and that the Ihwan al-Safa couple الاداب الرياضيّة with

الرياضيّة is translated by both המוסריות and ההרגליות.[28] The expression חכמת המוסר והשכל may be taken as a hendiadys, as if it were written חכמת המוסר השכלי, to be translated "the science of rational mathematics", that is to say, the "rational mathematics" of the Ihwan al-Safa as contrasted with the "sensible"—a reference to Al-Mukammas' own distinction between the "science" and the "art" of geometry. Now, in the Encyclopedia of the Ihwan al-Safa the difference between "rational" and "sensible" mathematics is described as follows: "The study of sensible mathematics is an aid to the thorough understanding of the practical arts; the study of rational mathematics is a guide to the thorough understanding of the speculative arts, for this science is one of the gates which leads to the knowledge of the substance of the soul. This knowledge is the beginning of the sciences, the constituent element of wisdom, and the root of the practical and theoretical arts".[29] Al-Mukammas' brief description of "the science of rational mathematics," quoted above, claims for it the same excellencies.

The second explanation would seem to be more plausible, for in another passage quoted again by Judah ben Barzilai, Al-Mukammas definitely enumerates mathematics, physics and theology as the three sciences, though he names them in a different order. He says: "Philosophy is the knowledge of all things according to the measure of their form, the secret of their nature, and the veracity of their impartation. We have felt it necessary to use three properties in the definition of philosophy, in order to be able to bring under this definition the three grades of philosophy. Thus the expression 'according to the measures of the form of things' makes this definition include the science which investigates the external form of things and the boundaries of their bodies, as arithmetic and the like. The expression 'the secret of their nature' makes it include the science which investigates the bodies of things and

as a description of their "propaedeutic" sciences exclusive of mathematics (See above p. 265).

[28] *Cuzari* III, 39; V. 12; V. 14. Here too, Reifmann changes מוסריות to מוסדיות (*loc. cit.*). See below n. 32.

[29] Dieterici: *Die Propaedeutik der Araber*, p. 36.

the secrets of their nature, as all the sciences which deal with the structure of heaven and earth and all created beings. The expression 'the veracity of their impartation' makes it include the science which is superior to all other sciences, namely, the science of the Torah by which those who fear God are favored". He then concludes: "In this fashion the grades of philosophy are three and the definition of philosophy as we have given it includes them all, and all these sciences are called the theoretical sciences or the sciences of the mind".[30]

The formal classification of philosophy (חכמה, علم) given by Bahya ibn Pakuda in the Introduction of the *Hobot ha-Lebabot* deals again only with the theoretical part of philosophy and follows Aristotle's threefold division, mentioning under mathematics the quadrivium.[31] There is only one point which must detain us here. In the Hebrew translation the Arabic الرياضّى, "propaedeutic", is rendered by השמוש and is followed by the

[30] *Pirush Sefer Yezirah le-Rabbi Judah b. Barzilai*, p. 66:
ואנו פותחים ראשונה ואומרים כי מלת חכמה נאמרת בלשון הקודש על שני ענינים, על החכמה שהיא חכמה ממש, אשר עליה אמר הכתוב, והחכמה מאין תמצא, והחכמה מאין תבא, והיא מדע כל הנמצאות על אומד תבניתם, ותוכן יצירתם, ואופן נתינתם. והוצרכנו לשום בגדר החכמה שלש חוצצים, כדי להכניס בגדר הזה שלש מעלות החכמה. ויהיה אומד תבנית הנמצאות מכניס בגדר הזה החכמה המעיינת בצורות הנמצאות החצונות, ותכלית גופן, כחכמת המנין והדומה לה. ותוכן יצירתם מכניס בו החכמה המעיינת בגופי הנמצאות, וסודי יצירתן, כלל החכמות המדברות על בנין שמים וארץ ושאר היצורים. ואופן נתינתם מכניס בו החכמה המעולה על כל החכמות, והיא חכמת התורה הנתונה ליראי השם... על הדרך הזה היא מעלות החכמה שלש מעלות, והגדר אשר שמנו לחכמה כולל אותם. והחכמות האלה נקראין חכמה שכלנית וחכמת השכל.

I have emended אומד to read אומד in אומד תבניתם.

The term חוצצים is the Arabic خاصّة, ἴδιον, *property*, one of the five predicables usually translated into Hebrew by סגולה or, as in *Cuzari* V, 12, מדה מיוחדה (See below n. 162). Kaufmann seems to have confounded it with فصل, διαφορά, *difference*, which is usually translated by הבדל, פרק or, as in *Cuzari* V, 12, חלק. (See below n. 162). Cf. Kaufmann's notes on *Pirush Sefer Yezirah le-Rabbi Judah b. Barzilai*, p. 336.

[31] והחכמה מתחלקת לשלשה חלקים. החלק הראשון, חכמת היצירות, שקורין לה בלשון ערב אלע'לם אלט'בעי, והיא חכמת טבעי הנופות ומקריהן. והחלק השני היא חכמת השמוש, שקורין לה בלשון ערבי אלע'לם רי'צי, ויש מי שקראה חכמת המוסר, והיא חכמת המנין והשעורים וחכמת הכוכבים וחכמת הנגון, הנקראת מוזיקא. והחלק השלישי קורין לה בלשון ערבי אלע'לם אל'די, והיא חכמת האלהות, והוא דעת האל יתברך ודעת תורתו, ושאר המושכלות, כנפש וכשכל וכאישים הרוחניים.

statement ויש מי שקראה חכמת המוסר, which has caused some difficulty to students.[32] It can be shown, however, that the statement is an interpolated gloss. There is nothing in the original Arabic text to correspond to it. In the *editio princeps* of the Hebrew translation, Naples 1489, and in the Venice edition of 1548 it does not occur.[33] It makes its first appearance in the Constantinople edition of 1550.[33a] That מוסר has been used as a Hebrew equivalent of رياضة has already been pointed out, and the ויש מי שקראה probably refers to the Hebrew translation of the *Cuzari*, if not also to Al-Mukammas.

The classification given by the Karaite Nissi ben Noah in his commentary on the Decalogue[33b] is of interest not only for some of the peculiar terms it contains but also for its textual difficulties. The text as it stands would seem to divide philosophy into metaphysics, mathematics and ethics, and this is how Steinschneider seems to understand it.[33c] This would make it a rather unusual arrangement of topics, though made up of parts taken from Aristotle's classification. The passage, however, bears internal evidence of being corrupt, as has already been suspected by Reifmann.[33d] In the first place, it begins with a statement that philosophy is divided into two parts, but mentions only one of these parts. In the second place, it says that the first part of philosophy is to be subdivided into two other parts, but, instead of giving these two parts, it enumerates the three sciences, metaphysics, mathematics and ethics. Evidently there is something missing in the text.

The passage, however, can be completed by filling out the gaps with phrases taken from the passages preceding and

[32] See commentary *Pat Lehem, ad loc.*; Fürstenthal's Hebrew notes *ad loc.*; Reifmann in *Ozar ha-Sifrut* II, pp. 49–50, who changes מוסר to מוסד. See above n. 28. Schmiedl in *Monatsschrift* 1861, p. 186; Kaufmann: *Die Theologie des Bachja Ibn Pakuda* in *Gesammelte Schriften* II, p. 21, note; Senior Sachs; *Kerem Hemed* VIII, p. 64.

[33] Nor does this addition occur in the quotation of this passage in Shabbethai Bass' (Meshorer's) *Sifte Yeshenim*, Zolkiew, 1806, f. 7b.

[33a] The gloss occurs in MS Adler 900 in the Jewish Theological Seminary.

[33b] *Pirush Aseret ha-Debarim* in Pinsker's *Likkute Kadmoniyyot* II, p. 9.

[33c] *Uebersetzungen*, p. 209, n. 734b.

[33d] Cf. *Ozar ha-Sifrut* II, p. 50.

following it. This reconstructed passage would yield us, in the first place, a general division of philosophy into scientific knowledge (דעת) and revealed knowledge (יראת אל שדי),[33e] and then, in the second place, under scientific knowledge, a complete Aristotelian classification with its general distinction of theoretical and practical knowledge and the subdivision of the former into metaphysics, mathematics and physics, and the subdivision of the latter into ethics, economics and politics.[33f]

No formal classification of the sciences is given by Judah ha-Levi. But here and there in his *Cuzari* he gives us snatches of classifications which seem to be torn out of an Aristotelian context, such, for instance, as his casual references to physics,

[33e] The distinction between these two kinds of knowledge is explained by the author in the preceding paragraph as follows:
שהחכמה נודעת משני פנים: הא' חכמה ותושיה נודעת מן הבריאה והיצירה, שהיא עולה במחשבה בהתקששם החכמים בשכלם, כמו ידיעת היוצר מן היצירה, שהתורה והנבואה עדים עליה ומאמינים בה. והשני חכמה ובינה, שהיא התורה והחזות, שניהם בנבואה, שהתורה והחכמה מצדיקים אותה ומאמינים בה,

[33f] The emended passage will read as follows:
והחכמה הזאת מתחלקת, כמו שאבאר למטה: הא' הדעת, והיא מתחלקת על שני חלקים. [והא' הדעת השכלית, והיא על ג' חלקים]: א' מהם דעת העליונה בשכל, כמו שיראה בדעת אל עליון ומלאכים ונפשות ורוחות. והשני, דעת המוסר, והוא נחלק על ארבעה חלקים: הא' דעת הטפחות והמדה. והב' דעת המספר והמנין. והג' דעת החבור והמזלות. והד' דעת העגבים והקולות. והשלישי מהם השכל ההתחתון, כדעת ארבע מטבעות. [והב' הדעת הטעשית], והוא על ג' חלקים: הא' נהילת העדה, כנהילה המלך למדינות ולארצות. והב' נהילת בני הבית, כנהילת המלך בני ביתו וקרוביו. והג' נהילת האיש לנפשו ביותר, כנהילת האיש לנפשו וגופו. [והב' יראת אל שדין]. לפיכך שידענו שיראת אל שדי [ית'] שמו היא ראשית החכמה, וכו'.

In the description of astronomy in this passage, דעת החבור והמזלות, if the term החבור is not a corruption of העבור, *inetrcalation*, then it must be taken in the astronomical sense of *conjunction*, i. e., the conjunction of the moon with the sun, as the equivalent of the more usual term קבוץ. See *Mishneh Torah*: *Kiddush ha-Hodesh* VI, 1:
בזמן שעושין על הראייה היו מחשבין ויודעין שעה שיתקבץ בו הירח עם החמה... ויודעין שעת קבוצן...
The term חבור in the classification of sciences ordinarily means music. See above n. 17.

The expression ארבע מטבעות refers to the four natural elements, היסודות הטבעיים, which is usually mentioned as one of the topics of physics. Steinschneider takes it in the sense of the four qualities of human nature and as referring to ethics (*Uebersetzungen*, p. 209, n. 734b). But see Reifmann in *Ozar ha-Sifrut* II, p. 51.

astronomy and music,[34] to astronomy and physics,[35] and to various topics of physics and to theology.[36] In one place he speaks of the reliability of the philosophers in matters mathematical and logical as contrasted with their unreliability in matters physical and metaphysical,[37] and in another place he enumerates physics, theology, mathematics and astronomy as some of the sciences embodied in the Mishnah and Talmud.[38] A complete classification of the three theoretical sciences and logic with an enumeration of their branches may be derived from his discussion of psychology in his attempt to explain how the hylic intellect comes into possession of rational ideas through application and study.[39]

In one of those mystifying passages in which the works of Abraham ibn Ezra abound some Jewish scholars think to have found a classification of sciences. In his commentary on Ecclesiastes III, 21, Ibn Ezra says as follows: "And the knowledge of the soul is shrouded in mystery, requiring subtle speculations, and nobody can grasp even a small part of its nature except those thinkers whose thought has become clarified in the balance of wisdom and its elements four, of which three are ספר ספר וספור and, [the fourth], that which is composed of the two".[40] Friedlaender translates the three Hebrew words by

[34] *Cuzari* II, 64: עלם אלאפלאך–חכמת הגלגלים; אלטביעיה–הטבעיות
עלם אלמוסיקא–חכמת המוסיקא.

[35] *Ibid.* IV, 29: עלם אלפלך–חכמות הכוכבים והגלגלים; עלם אלהיה–חכמת התכונה
אלעלם אלטביעי–החכמה הטבעית.

[36] *Ibid.* V, 2:
הטבעיים, והאצטגנינים, ובעלי הטלסמאות, והמכשפים, ואנשי הקדמות, והפילוסופים... ההיולי והצורה... היסודות הנקראים בערבי אסטקסאת... הטבע... הנפש... השכל... החכמה האלהית.–אלטביעיין, ואלמנמין ואלטלסמין ואלסחרא ואלהדריין ואלטסתלספין... ללהיולי אלמשתרכה... אלאסטקסאת... אלטביעה... אלנפוס... אלעקל... אלעלם אלאלאהי.

[37] *Ibid.* V, 14:
לטה שנחברר מהם המופת בחכמות ההרגליות (אלריאציה) וההגיון (ואלמנטק) בטחו הנפשות על כל מה שאמרוהו בטבע (פי אלטביעה) ובמה שאחר הטבע (ופי מא בעד אלטביעה).

[38] *Ibid.* III, 39:
ומי שהוא רוצה להאמין בו יראה חכמת המשנה והתלמוד והם מעט מהרבה מחכמות הטבעיות (אלעלום אלטביעיה) והאלהיות (ואלאלאהיה) והמוסריות (ואלריאציה) והגלגליות (ואלפלכיה).

[39] *Ibid.* V, 12.

[40] ודעת הרוח עמוקה וצריכה לראיות, ולא יוכלו להבין אפילו קצתם, כי אם המשכילים, שהתבררה מחשבתם במאזני החכמה ובארבעה יסודותיה, שהשלשה מהם ספר וספר וספור, וטורכב מן השנים,

"reading, writing and arithmetic".[41] There is, however, no basis for this translation except that the three Hebrew words with their alliteration lend themselves to a rendering into the proverbial three R's. Rosin identifies all the four elements with mathematics, grammar, logic and physics.[42] The difficulty with this rendering is that that it does not correspond to either the Platonic or the Aristotelian classiffication. Furthermore, the expression מורכב מן השנים for Physics is rather far-fetched. Rosin's reference to the Ihwan al-Safa in support of his classification seems to be irrelevant. Besides, we have already seen that their classification of the purely philosophic sciences is strictly Aristotelian. Krochmal conjectures that the four elements refer to the four types of immediate knowledge, namely, sense perceptions, intellectual notions, traditions and general opinions.[43] But he makes no attempt to show how the text can be made to assume this interpretation.

It seems to me that this passage has no reference to the classification of sciences nor to the types of immediate knowledge Its meaning is to be sought elsewhere. The puzzling words ספר וספור ספר in Ibn Ezra are a well known quotation from *Sefer Yezirah* I: וברא את עולמו בשלשה ספרים, בספר וספר וספור Now this in itself would not help much, for the passage in the original source is in itself a conundrum and his been variously interpreted by ancient and modern commentators. But Saadia's interpretation of this passage willl throw light upon the difficulty. Says Saadia:[44] "The expression 'He hath created the world in three books' means to say that all things may be registered in three ways." He then raises the question why only three ways are mentioned, seeing "that the philosophers have enumerated four ways, for they have said that things may exist under four aspects, in their substance, as when we see a man; in spoken words, as when we

[41] M. Friedländer: *Essays in Ibn Ezra*, p. 26, n. 3.

[42] *Monatsschrift* XLII, p. 448.

[43] Extracts from Ibn Ezra's commentary on Ecclesiastes in *Moreh Nebuke ha-Zeman.*

[44] M. Lambert: *Commentaire sur le Séfer Yesira ou Livre de la Creation par le Gaon Saadia de Fayyoum*, pp. 42–43; Arabic text, pp. 22–23.

say, 'man'; in writing, as when we write the latters *m a n*; in thought, as when we form an idea of a man". Explaining why substance is omitted, Saadia concludes: "The author finds that there are three ways in which a thing can be expressed, namely, writing, number, and the spoken word, which, added to substance, make in all four". Saadia further explains that "number" stands here for "thought", for it is a species of thought, and he gives ספר מחשבה וספור as the equivalent of ספר וספור. In the light of this explanation it is clear that Ibn Ezra's mention of the four elements of knowledge refers to the four modes of knowing things enumerated by Saadia, of which he quotes from *Sefer Yezirah*, again following Saadia, the three, namely, סֵפֶר "the written word", סְפָר "the number", i. e., the idea, and סִפּוּר "the spoken word", and adds Saadia's fourth mode, "that which is composed of the two", i. e., substance. Substance, says Aristotle, applies to matter, form, and to the concrete thing which is composed of the two.[45] Ibn Ezra similarly says: "All created beings are composed of two, namely, matter and form."[46] That Abraham ibn Ezra refers here to four modes of knowledge rather than to classes of sciences may be inferred from his use of the expression מאזני השכל. The word מאזני reflects the Arabic ميزان, which, while literally meaning "balance", is also used in the sense of "judgement,"[47] "rule" and "method", and hence the expression מאזני השכל undoubtedly means 'the laws of thought" or "the modes of knowledge."

There is, however, another passage in which Ibn Ezra refers to a classification of sciences. In his commentary on Proverbs 9, 1, he attempts to give a different rendering of the verse which is usually translated: "Wisdom hath builded her house, she hath hewn out her seven pillars". "It may be explained", he says, "that the plural חכמות is used here in order to show that the meaning of the verse is that out of the seven wisdoms she (=wisdom) hath builded her house. This is what is meant by

[45] See *Metaphysics* VII, 10, 1035a, 1.

[46] See D. Rosin: *Reime und Gedichte des Abraham ibn Ezra*, p. 42, n. 13: והנבראים שנים, שהם עצם וצורה

[47] See Munk: *Guide des Égarés*, I, 62, p. 279, n. 1.

'she hath hewn out her seven pillars', 'her pillars' here referring to the pillars of the house, and thus the second strophe is an explanation of 'out of wisdoms she hath builded her house'. Accordingly, the word בית is used here in the feminine gender. Or, 'her pillars' may refer to the pillars of wisdom, and these pillars are the seven branches of wisdom upon which the house of wisdom is erected. Some, however, interpret the number seven here to refer to something else, but *suum cuique* and truth will show the way."[48]

There are several possible lists to which these "seven sciences" may refer, and we shall mention them in the sequel. But here one is inclined to take the number seven to refer to the three branches of the Aristotelian theoretical philosophy, including the mathematical quadrivium, and to logic, thus making in all seven, for under these heads one may arrange all the specific sciences, outside the purely linguistic sciences, which Ibn Ezra enumerates in the first chapter of *Yesod Mora* as prerequisites to the proper understanding of the Bible and the Talmud. They are in the order in which they are first mentioned as follows: Astronomy (חכמת המזלות), geometry (חכמת המדות), psychology (חכמת הנפש), physics (חכמת התולדות, חכמת תולדות השמים והארץ), astrology (משפטי המזלות), logic (חכמת המבטא, חכמת ההגיון), arithmetic (חכמת החשבון), proportion (חכמת הערכים), theology (סוד המרכבה ושעור קומה סוד הנפש ומלאכי עליון והעולם הבא). Elsewhere he also mentions music (חכמת הנגינות).[49] All these may be tabulated according to the Aristotelian classification, making a list of seven sciences, as follows:[50]

1. A. Logic
   B. Theoretical sciences
2. I. Theology (including psychology)[51]

[48] ויתכן לפרש שאמר חכמות להודיע שהחכמה בנתה ביתה מחכמות שבע, וזה טעם חצבה עמודיה שבעה, והם עמודי הבית, והוא הביאור למאמר חכמות בנתה ביתה, ובית לשון נקבה. או עמודיה שבעה, עמודי החכמה, והעמודים הם שבע החכמות שבית החכמה נכון עליהם. ויש מפרשים אלה השבעה על העניינים אחרים, וכל אחד בוחר לעצמו, והאמת יורה דרכו.

[49] M. Friedländer; Essays on Ibn Ezra, Hebrew Text, p. 43.

[50] Contrast with this the classification made by Rosin in *Monatsschrift* XLIII, p. 232.

[51] For the inclusion of psychology within theology see below p. 294.

II. Mathematics
3. a. Arithmetic (including Proportion)
4. b. Geometry
5. c. Astronomy
6. d. Music
7. III. Physics (including Astrology)[52]

Like Judah ha-Levi, Abraham ibn Daud does not give a formal classification of sciences but refers to it incidentally in his description of the gradual stages in which the soul acquires knowledge. He mentions there mathematics (הלמודיות), physics (הטבעיות) and theology (האלהיות).[53] In addition to the specific enumeration of these three sciences, which he does not describe by the general term theoretical, he also speaks of a practical class of philosophy (פילוסופיא מעשית).[54] In another long passage Abraham ibn Daud gives not exactly a classification of sciences but something that may be described as an evaluation of the sciences, especially medicine, philology, mathematics and law.[55] The passage will be reproduced at the end of this paper.

A rather novel classification is given by Joseph ben Isaac Kimhi in the Introduction to his *Sefer ha-Galui*. While on the whole the topics are drawn from the Aristotelian classification, they are grouped differently. All the sciences, according to this author, are divided into three parts. First, those which are useful only for the world to come. Second, those which are useful both for this world and for the world to come. Third, those which are only useful for this world. Under the first he includes theology in all its branches. Under the second he mentions at random astronomy, geometry and medicine, by which he evidently means to include the entire field of mathematics and

[52] Astrology is part of physics according to Algazali's *Tahafut al-Falasifah* quoted by Caleb Afendopolo (See *Monatsschrift* XL, p. 93).

[53] *Emunah Ramah* II, iv, 1, p. 58:
ואחר ילך בהדרגה אל חלוקת ההקדמות, וסדורם על תמונות מה, והולדת התולדות ההם, עד שיגיעו לו החכמות הלימודיות, והטבעיות, והאלהיות.

[54] *Ibid.*, General Introduction, p. 4:
אמנם נושא העיון הזה הנה מבואר שהוא פילוסופיא מעשית.

[55] *Ibid.*, II, Introduction, p. 45.

physics. Under the third he includes the productive arts, or the *artes mechanicae*[55a].

Of all the classifications of sciences the most comprehensive and complete, despite its brevity, and the most truly Aristotelian is that given by Maimonides in the *Millot ha-Higgayon* XIV. We shall reproduce it here with a running commentary.

He begins with a statement as to the use of the term מלאכה. This term may be taken to represent the Arabic صناعة and the Greek *τέχνη*, meaning "art". Now, *τέχνη* in Aristotle has, on the whole, two meanings. In *Metaphysics* I, 1, the term *τέχνη* is used in the sense of *θεωρία*, *speculation*, and is contrasted with *ἐμπειρία*, *experience*, and *αἴσθησις*, *perception*. In *Ethics* VI, 3, however, the term *τέχνη* is used in the sense of *ἐπιστήμη ποιητική*, *productive science*, as contrasted with both *ἐπιστήμη θεωρητική* *theoretical science*, and *'επιστήμη πρακτική*, *practical science*. In these two senses the equivalent Arabic term صناعة is used by the Ihwan al-Safa when they divided the sciences into الصنائع العلميّة, *speculative arts*, and الصنائع العمليّة, *productive arts*. As has already been shown, the former stands for both the *θεωρητική* and the *πρακτική*, whereas the latter stands for the *ποιητική*. Referring to this, Maimonides thus says: "The term art is used among the ancients in an equivocal sense and is applied by them to every theoretical science and to all works of production. They thus call every philosophic discipline a theoretical art and every form of carpentry and masonry and their like a productive art".[56]

[55a] *Sefer ha-Galui*, Introduction, pp. 1–2:
ודע כי כל החכמות הנמצאות במדרגת שלש כסאות. החכמה העליונה היושבת בכסא כבוד מראשון היא חכמת אלהות בדעת יחוד הבורא ובחורותיו ובמצותיו להשיג אהבתו לעולם הבא. ואין לזאת החכמה חלק בזה העולם, כי צריך האדם שתהיה כוונתו לעבוד הבורא ולאהוב אותו ולא בעבור העולם הזה. והחכמה היושבת במדרגת השנית היא חכמת הכוכבים וחכמת השעורים וחכמת ההפואות ודומיהם, שהם נחלקים לצורך העה"ז ולצורך העה"ב, ומותר ליהנות מהם בעה"ז. והחכמה היושבת במדרגה התחתונה היא חכמת המלאכות והאומניות לישוב העה"ז, חקון בתים ושדות וכרמים ומלבושים וכסף וזהב וחקון אבנים טובות ודומיהן.

[56] והשם מלאכה אצל הקודמים שם משתף, יפילוהו על כל חכמה עיונית [חכמה שכלית Ahitub's translation:]. ויפילוהו גם כן על כל המעשים המלאכתים. ויקראו כל חכמה מחכמת הפילוסופיא מלאכה עיונית [שכלית Ahitub:]. ויקראו כל אחת מהנגרות והחצבות ומה שדומה להן מלאכה מעשית [מלאכה מלאכותית Ahitub:].

Maimonides thus like the Ihwan al-Safa divides the Aristotelian sciences into two parts, calling the *θεωρητκή* by its given name and designating both the *πρακτική* and the *ποιητική* by the general name "philosophy", the latter of which he also calls "theoretical art" [שכלית] מלאכה עיונית. Similarly Averroes, in his classification of the sciences, couples "art" and "science" together.[57]

Maimonides now takes up the term "philosophy". This, too, is an equivocal term, for in a general sense it applies to the art of demonstration, מלאכת המופת, i. e., logic, and the special philosophic disciplines.[58] Similarly Averroes, and as we shall see also Aristotle, says that philosophy in a general sense includes also logic. But, properly speaking, says Maimonides, logic is not a philosophic discipline; it is only an instrument (כלי, *ὄργανον*). Thus the term philosophy is to apply only to the theoretical and practical disciplines. We therefore now have a new set of terms, "theoretical philosophy", הפילוסופיא העיונית, and "practical philosophy", הפילוסופיא המעשית, which are not to be confused with "theoretical art", מלאכה עיונית, and "practical art", [מלאכותית] מלאכה מעשית. In Hebrew, it should be noticed, the same term מעשית is used for both *πρακτική* and *ποιητική*. Similarly the Arabic term عمليّة, used by the Ihwan al-Safa, has these two meanings, as has already been pointed out.[59]

The "theoretical philosophy" is divided by Maimonides into the conventional physics, mathematics and metaphysics, mathematics being again subdivided into the quadrivium. Of the subdivisions of "practical philosophy," we shall speak later.

In the literature after Maimonides, the Aristotelian scheme continues to be the model for all classifications. The occasional mention of the sciences in such works as the *Ma'amar Ikkawu ha-Mayim* by Samuel ibn Tibbon,[60] the *Sefer ha-Yareah* by

[57] Cf. *Epitome of the Metaphysics.*

[58] ושם הפילוסופיא שם משתף, פעמים יקראו בו מלאכת המופת, ופעמים יקראו בו החכמות.

[59] See above p. 266.

[60] *Ma'amar Ikkawu ha-Mayim*, Ch. XI, p. 54:

וזה הטין הוא מה שקורין חכמי המחקר חכמת התכונה, והוא חלק מהחכמות שקורין הרנליות או למודיות.

Abba Mari Don Astruc of Lunel,[61] and the *Nobelot Hokmah* by Joseph Solomon Delmedigo[62] all belong to this category. Of a similar nature is the classiffication given by Abraham Shalom in his *Neveh Shalom*.[63]

It is this Aristotelian classification which forms the groundwork of the encyclopedic works in Hebrew beginning with the thirteenth century, though some confine themselves only to certain selected sciences and other amplify their plan by introducing auxiliary linguistic and religious sciences after the manner of the encyclopedia of the Ihwan al-Safa. Judah ben Solomon ha-Kohen ibn Matkah in his *Midrash ha-Hokmah* enumerates

[61] *Sefer ha-Yareah*, ch. 1, p. 125:
ידוע ומפורסם לחכמים כי מיני החכמות שנים: הא' חכמת הטבע, היא חכמה מעשה בראשית, והב' חכמת אלהית, והוא מעשה מרכבה. ויש עוד חכמה נ' שהיא במדרגה לאלו הב', ונקראת חכמה למודית, מפני שהיא מרגלת השכל ומלמדת אותו להשיג האמתיות. ויש לחכמה הזאת כמו מספר תכונה תשבורת, והם שקורין אוחה ז' חכמות, מהם שהם מדרגות קרובות לחכמות הטבע, ומהם שהם מדרגות קרובות לחכמת האלהית. ואע"פ שהם מדרגות לב' החכמות יש לכל אחד תכלית מכוונת לעצמה, המשל בזה מלאכת הרפואה, תכליתה הראשון מכוון לב' חלקים. החלק הא' שמירת הבריאות. והחלק הב' הסרת החולי, ומי שיקרא רופא מסיר החולי כן יקרא רופא שומר הבריאות. והוא שאמר הכתוב: כל המחלה אשר שמתי במצרים לא אשים עליך כי אני ד' רופאך, ר"ל שומר בריאותך. וכמו שיש תכלית מכוון למלאכת הרפואה, כן יש תכלית מכוון לשאר החכמות, שהוא נדר וגבול לחכמה ההיא. ויש תועלת נדולה לחכמים יראי ה' לכל אחד מהחכליות, כי בהם יבחן האדם סוד המציאות, וידע וישכיל קצת מפליאות ד', ויעלה באלה המדרגות עד שיניע אל ב' החכמות העליונות, והם מעשה בראשית ומעשה מרכבה, ומתוך כך ידע ויכיר מי שאמר והיה העולם.

As for the sevenfold division of the mathematical sciences see quotation from Avicenna above n. 8. As for the propaedeutic character which this passage ascribes to mathematics see above n. 22.

[62] *Nobelot Hokmah*, f. 4a:
ועוד יש קדימת הסדר אצל הפילוסופים כאשר יאמר שהדקדוק קודם בסדר הלמוד למלאכת השיר או להלצה ולהניון, וההניון לטבעית, והטבעית לאלהית, וחכמת המספר והשעור לתכונה או למיכאניקה או לחכמת הראייה.

[63] *Neveh Shalom* V, 7 f. 74b–75a:
ולפי שסוני החכמות שבהם ישלים האדם נפשו הם שלש: האחת, הלמודית, והיא ידיעת צורת הגלגלים... והנה סוג אחר נמצא לחכמה והיא הטבעית, ונחלק המדע הטבעי לשמנה חלקים עצומים... ותמצא אלו השמנה חלקים באו בשלמות בתורתנו במעשה בראשית... הסוג השלישי הוא חכמת האלהות.

The term צורת הגלגלים in this passage is not to be taken as the ordinary translation of صورة, *εἶδος*, but rather as synonymous with תכונה and like the latter may be considered as a translation of هيئة, *διάθεσις*, for the Arabic هيئة literally means not only "dispositions" but also "form" (See below n. 155, 179).

physics, mathematics and metaphysics, to which he adds logic as an instrument to the sciences but not included among them.[64] Shem-tob Joseph Falaquera deals with the classification of sciences in several of his works. In his *De'ot ha-Pilusufim* he deals only with physics and metaphysics and of the latter only with the problem of the active intellect.[65] But his *Reshit Hokmah*, which is devoted to the classification of sciences, contains a complete Aristotelian classiffication. A similar classification is found in his poem at the beginning of the *Reshit Hokma* and parts of it may also be found in his *Mebakesh*. Gershon ben Solomon of Arles in his *Sha'ar ha-Shamayim* deals with the three parts of the Aristotelian theoretical philosophy, physics, mathematics and metaphysics, but in mathematics he confines himself to astronomy and he similarly narrows down the scope of metaphysics to psychology only.[66] A complete classification is given by Caleb ben Elijah ben Judah Afendopolo in his commentary on a Hebrew translation of the arithmetic of Nichomachus of Geresa. It comprises logic and all the branches of theoretical as well as practical philosophy.[67] A somewhat modified plan is found in the encyclopedia *Kelal Kazer mi-Kol ha-Rashum Biketab* by Judah ben Joseph ibn Bulat. He divides all learning into (a) sacred and (b) profane (הלמודיים החצוניים, חולין), a division which is not unknown among the Scholastics.[68] Under profane sciences, however, he enumerates the Aristotelian practical and theoretical philosophy and also logic and linguistics.[69] Similarly Solomon ben Jacob Almoli divides his encyclopedia *Meassef Lekol ha-Mahanot* into speculative sciences and traditional sciences, giving under the former linguistics, logic and the branches of the Aristotelian theoretical and practical philosophy.[70]

A sevenfold classification of science is to be found in the

[64] See Steinschneider: *Uebersetzungen*, § 1.
[65] *Ibid*, § 2.
[66] *Ibid.*, § 3.
[67] Steinscneider: *Monatsschrift* XL, pp. 90–94.
[68] See H. O. Taylor: *The Mediaeval Mind*, II, p. 343.
[69] See Steinschneider: *Uebersetzungen* § 8.
[70] *Ibid.*, § 9.

writings of Zerahiah Gracian (Hen), Moses da Rieti and Leo Hebraeus (Judah Abarbanel). It is significant that all these three lived in Italy and were acquainted with Latin literature. The sevenfold classification must have been introduced by them under the influence of the enumeration of the so-called seven liberal arts which, beginning with Varro, contemporary of Cicero, runs throughout European literature.[71] But these Jewish authors accepted only the number seven, which was not entirely new in Hebrew literature, without its contents. The seven liberal arts are as a rule the trivium, (grammar, logic, rhetoric) and the quadrivium, (arithmetic, geometry, astronomy, music). In all these three Jewish authors, however, the seven sciences are physics, metaphysics, the four branches of mathematics and practical philosophy. Thus Zeraḥiah Gracian in his commentary on Proverbs 9, 1, "Wisdom hath builded her house, she hath hewn out her seven pillars." says as follows: "After he has finished his discourse about Wisdom, he proceeds to mention in passing the classes of science that constitute Wisdom. He says their number is seven, which is well known to students of philosophy. These seven are divided into two parts. The first is mathematics, which includes four disciplines, namely, arithmetic, geometry, music and astronomy. The second part is philosophy and is divided into three branches: physics, theology and politics".[72] The same enumeration is given by Moses da Rieti in his *Mikdash Me'at*.[73]

[71] See Robert Flint: *Philosophy as Scientia Scientiarum*, pp. 88–89.

[72] See *Ha-Shahar* II, pp. 226–7:

חכמות בנתה ביתה חצבה עמודיה שבעה. אחר שכלה לדבר בדבר החכמה בא לזכור לך על צד הרמז מיני החכמות, ואמר שהם שבעה, כמו שזה ידוע אצל אנשי החכמה, והם נחלקים לשני חלקים, האחד הוא הלמודים אשר בכללם ד' חכמות, שהם חכמת החשבון, הגמטריא שהוא בערבי אלהנדסה, המוציקא בלשוננו ניגון, וחכמת הכוכבים. והחלק השני הוא הפילוסופיה, ונחלקת לג' חלקים, חכמת הטבע, וחכמת האלהות, והנהגת המדינה.

[73] *Mikdash Me'at* I, 3:

במספר החכמות... נלקח מדברי אבונצר אלפראבי ואלגזלי ואבן רשד והרב ז'ל.
הראשונות שבעה למיניהן
תשבורת, מספר, תכונה, נגון,
תחת הלמודים סדורות הן.
הטבעיות–גם בסדר הגון
האלהות והמדות, ובם

In Judah Abarbanel's *Dialoghi di Amore* the same seven sciences are called *arti liberali* of which the Hebrew translator gives the Hebrew equivalent השבע חכמות.[74] A reference to seven sciences is also found in Abba Mari Don Astruc of Lunel's *Sefer ha-Yareah*,[75] but his seven are the seven branches of mathematics enumerated by Avicenna. Similar allusions to the number seven is found in Joseph ben Isaac Kimhi's Introduction to his *Sefer ha-Galui*[76] and in Moscato's commentary *Kol Yehudah* on the *Cuzari*.[76a] Abraham ibn Ezra's reference to the seven sciences has already been discussed above.

The three theoretical sciences are of unequal importance and they are therefore arranged according to a certain gradation of value. Aristotle himself evaluated these sciences, declaring metaphysics to be superior to the others.[77] In Arabic and Jewish philosophy, Avicenna, Algazali, Al-Mukammas and Bahya use the terms "superior", "middle" and "inferior" in the description of metaphysics, mathematics and physics respectively. Accordingly the logical order of arranging these sciences would be either from the highest to the lowest or *vice versa* from the lowest to the highest. And in fact, these two methods of arrangement are found to have been followed indiscriminately by various authors. Thus Algazali and Al-Mukammas (in one instance)[78] begin with the highest, metaphysics, whereas Bahya, Judah ha-Levi (in one instance),[79] Judah ibn Matkah, Solomon of Arles, Abba Mari Don Astruc, Caleb Afendopolo,

חיי הלב ולא יהיה עגון.
. . . . . .
ושני כלים להם אתה בוחר
דקדוק הלשון גם ההגיון
כי הם לכל כאניות סוחר.

[74] See *Wikkuah al ha-Ahabah*, p. 7b:
ובו נכללו השבע (חכמות), ארטי ליביראלי.
For his entire classification see p. 8b.

[75] See quotation above in n. 61.

[76] מי חכם ויבין אלה ונבון ויתבונן במופלא לחקור ולדרוש בשבעה עמודים שחצבה החכמה.

[76a] See his comment on the enumeration of topics under metaphysics in Book V, section 12: והיא אשר הטביעה אדניהם לעמודיהם שבעה.

[77] *Metaphysics* VI, 1, 1026a, 23.

[78] See quotation in n. 23.

[79] *Cuzari* V, 12.

and Judah ibn Bulat begin with the lowest, physics. In many enumerations, however, we find that the order given is that of mathematics, physics and metaphysics.[80] Thus we find it in the Ihwan al-Safa, Alfarabi, Israeli, Al-Mukammas (in one instance),[81] Judah ha-Levi (in one instance), Abraham ibn Daud, Maimonides, Zerahiah Gracian, Moses da Rieti, Abraham Shalom, and Solomon Almoli. This peculiar phenomenon may be explained by the distinction between the arrangement of these sciences according to the order of importance and their arrangement according to the order of study—a distinction, already pointed out by Reifmann.[82] According to the former method of arrangement, mathematics occupies a place between physics and metaphysics, for reasons which will be made clear in the sequel. But according to the latter method of arrangement, mathematics comes before physics.[83] We have a clear statement on the order of study in Maimonides where warning is given that instruction should not begin directly with metaphysics but should start with logic and should then proceed from mathematics through physics to metaphysics.[84] A similar warning is sounded

[80] This order is followed by Aristotle himself in *Metaphysics* VI, 1, 1026a, 19. In *De Anima* I, 1, 403b, 10–16, however, mathematics is placed between physics and metaphysics. But, on the other hand, physics is sometimes referred to by Aristotle as the "second" philosophy. Cf. Zeller: *Aristotle* I, p. 186.

[81] See quotation in n. 30.

[82] See *Ozar ha-Sifrut* II, pp. 49 and 50.

[83] That the order of study of the sciences was to be distinguished from their mere classification may be derived from the fact that Alfarabi, in addition to his work on the *Enumeration of the Sciences* (במספר החכמות), has also written a treatise on the *Order of the Study of the Sciences* (אגרת בסדור קריאת החכמות). See Steinschneider: *Uebersetzungen*, pp. 293–294. Similarly Averroes, at the beginning of his *Epitome of the Metaphysics*, after classifying the sciences, discusses their proper order of study. See also quotation from *Nobelot Hokmah* above in n. 62.

[84] See *More Nebukim* I, 34:

אי אפשר אם כן בהכרח למי שירצה השלמות האנושי מבלתי התלמד תחלה במלכת ההניון ואחר כן בליטודיות על הסדר ואחר כן בטבעיות ואחר כן באלהיות.

By על הסדר after לימודיות, Maimonides evidently refers to the four branches of mathematics. See also Maimonides' letter to Joseph ibn Aknin which forms the Itroduction to the *Moreh* where the author refers to having taken him through a course of mathematics and logic in preparation to the

by Judah ha-Levi who criticises the Karaites for plunging directly into metaphysics without first going through the preliminary disciplines.[85] There is no justification however, for Steinschneider's and Kaufmann's attempt to prove the alleged Karaism of Al-Mukammas on the ground of his naming metaphysics first in his enumeration of sciences.[86] Al-Mukammas is simply arranging the sciences in the order of importance, starting with the highest, and his classification was not meant to be taken as a programme of study. In fact, Al-Mukammas himself, as we have seen, in another place, changes the order and names mathematics before physics and metaphysics.[87]

The order of importance of these sciences is determined by the subject matter with which they deal. We thus come to another point in our discussion, namely, the definition of each of these sciences, their subject matter and the special disciplines which they comprise.[88]

Metaphysics[89] seems to have been defined by Aristotle in

study of metaphysics. But later in the same letter, according to a marginal note in Alharizi's translation, Maimonides recommends physics as an additional preparatory study:

ולא יבין זה אלא מי שהקדים לדעת מלאכת ההגיון וטבע המציאות.

This passage occurs neither in the Arabic text nor in Ibn Tibbon's translation. There seems to be, however, an inconsistency in these passages as to whether logic precedes mathematics or *vice versa*.

An outline of a ten year programme of study, attributed to Aristotle, is given in Al-Harizi's translation of Honain ben Isaac's *Musare ha-Pilusufim* I, 11: בסדר למוד עשר החכמות. There mathematics precedes logic.

[85] See *Cuzari* V, 2:

לא אנהג בך על דרך הקראים אשר עלו אל החכמה האלהיה מבלי מדרגה.

[86] See Kaufmann: *Die Theologie des Bachja Ibn Pakuda* in *Gesammelte Schriften* II, p. 21, note, and cf. quotation above in n. 23.

[87] See quotation above in n. 30.

[88] Thus Algazali, after defining each science, discusses its "subject", موضوع, נושא, and its "branches" فروع, סעיפים. The Ihwan al-Safa speak of the main divisions and the subdivisions of the sciences as the "genera", اجناس and the "species", انواع.

[89] "Metaphysics", *μετὰ τὰ φυσικά*, is also called by Aristotle "theology", *θεολογία*, and the "first philosophy", *πρώτη φιλοσοφία* (cf. Zeller: *Aristotle* I, p. 76, n. 1 and 2). All these terms are used in Arabic and Hebrew philosophic literature, as in the following passages:

three ways. First, he describes it as the science which deals with "something which is eternal and immovable and separable [from body]".[90] Second, he characterizes it as the science which deals with "being *qua* being—both what it is and the attributes which belong to it *qua* being".[91] Third, he very often speaks of metaphysics as including the principles of mathematics, logic and physics. He thus says that metaphysics must include "the truths which are in mathematics called axioms;"[92] it must deal with the logical methods of demonstration, for "the philosopher, who is studying the nature of all substance, must inquire also into the principles of syllogism;"[93] and it must also comprise the general principles of physics, such as the four causes and the like.[94] Of these three definitions Algazali reproduces the first,[95] Avicenna the second,[96] and Alfaribi restates the first[97] and the third.[97a].

Maimonides: *Millot ha-Higgayon*, Ch. XIV:
ויקראו גם את החכמה האלהית מה שאחר הטבע.
Algazali: *Makasid al-Falasifah* II, p. 76:
الالهى والفلسفة الاولى, האלהית והפילוסופיא הראשונה
So also Judah ibn Bulat: הלמודים האלהיים and הפילוסופיאה הראשונה, (See *Uebersetzungen*, p. 30, n. 194).
Ibn Bulat uses also the expression החכמה הרבנית, ربّانية (See *Ibid*).

[90] *Metaphysics* VI, 1, 1026a, 10–11. See also *De Anima* I, 1, 403b, 15–16.
[91] *Metaphysics* VI, 1, 1026a, 31–32.
[92] *Ibid.*, IV, 3, 1005a, 20.
[93] *Ibid.*, 1005b, 5–8.
[94] *Ibid.*, I, 3, 983a, 24. cf. Grote: *Aristotle*, II, p. 135.
[95] See *Makasid al-Falasifah* II, p. 78.
[96] See quotation above in n. 8.
[97] See T. J. De Boer: *Philosophy* (*Muslim*) in Hastings' *Encyclopedia of Religion and Ethics*, IX, p. 881: "The doctrine of the existent in general, together with its *accidents*". The word *accidents* is erroneously used here. The existent in general can have no accidents. The underlying Arabic word must have been something meaning *attributes*. Thus in the definition reproduced in Falaquera's *Reshit Hokmah* it is correctly stated והדברים אשר יקראו להם בטה שהם נמצאים, i. e., "and the things which are predicated of them *qua* being" and not אשר יקרו להם, i. e., "which are accidental to them *qua* being". See quotation below in n. 102 and reference to Aristotle above n. 91.
[97a] See De Boer, *loc. cit.* and compare Averroes' classification in his *Epitome of the Metaphysics*.

In Jewish philosophy, too, these three definitions of metaphysics are restated in whole or in part. Thus in the *Cuzari* two of these definitions are given. The first is reproduced in the following words: "Things metaphysical, such as the knowledge of the principles of being *qua* being and the attributes which belong to it".[98] The third definition is reproduced later in the same passage as follows: "And the establishment of the principles of the speculative sciences, the mathematical and the physical as well as the logical, which cannot be attained except by this science [i. e., metaphysics]".[99] The first and third definitions are given by Maimonides. He says: "Theology is divided into two parts: First, it is an inquiry into every being that is not material nor a force inherent in a body.... The second part of theology is an inquiry into the underlying causes of everything included in the other sciences."[100] The ~~first~~ second and third definitions may also be discerned in the vague poetic verses of Moses da Rieti, in the following passages: "Where the mind causes its cloud to rest over absolute being in general and its attributes....And there the Philosopher has shed his light over the principles of demonstration and has spread his pavilion over the other sciences".[101] Abraham Shalom mentions only the

[98] *Cuzari* V, 12:

והצטיירות הדברים האלהיים וידיעת התחלת המציאה בסתם מצד שהיא מציאה והתלויים בה.–והצור אלאמור אלאלאהיה ומערפה מבאדי אלוגוד אלמטלק מן חית הו וגוד ולואחקה.

This definition is almost a verbal reproduction of Aristotle's passage referred to above in n. 91.

[99] Ibid.:

וקיום התחלות החכמות העיוניות מהמוסריות והטבעיות מן הדבריות אשר לא יניעו אליהם אלא בזאת החכמה.–ואתבאת מבאדי אלעלום אלנטריה מן אלריאצה ואלטביעיה מן אלמנטקיה אלתי לא יתוצל אליהא אלא בהדא אלעלם.

[100] *Millot ha-Higgayon* XIV:

והחכמה האלהית תחלק לשני חלקים, אחד מהם הוא העיון בכל נמצא שאינו נשם ולא כח בנשם, והוא הדבור במה שנחלה באל יתעלה שמו, ובמלאכים גם כן לפי דעתם, כי הם לא יסברו שהמלאכים נשמיים אבל יקראו אותם השכלים הנפרדים. והחלק השני בחכמת האלהית, העיון בסבות הרחוקות מאד מכל מה שיגללו עליו שאר החכמות האחרות [לכל מה שכוללת אותן שאר החכמות האחרות :Ahitub] ויקראו גם כן את החכמה האלהית מה שאחר הטבע.

[101] *Mikdash Me'at* I, 3:

מקום השכל ענגו ישרה
על הנמצא המשולח כולל

second but seems to imply that the first is included in it.[101a] All the three definitions are mentioned by Shem-tob Falaquera[102] and Caleb Afendopolo[102a] in their enumeration of the topics of metaphysics.

After the definition of metaphysics and a general description of the subject matter with which it deals there naturally follows an enumeration of the topics which are included under this science. We shall first give a tabulated list of topics mentioned by various authors and then we shall make a few general observations about them.

The Ihwan al-Safa enumerate five topics: (1) The Creator and His attributes, such as unity, existence, knowledge, providence and the like. (2) Spiritual beings (i. e., the Intelligences). (3) Soul. (4) Ethics in its various branches, including the Aristotelian subdivisions of practical philosophy and revealed law. (5) Eschatalogy.[103]

Algazali gives two lists of general concepts, as follows: (a) Unity, cause and effect, likeness and difference, being and privation.[104] (b) Substance and accident, whole and part, one and many, cause and effect, potential and actual, like and dif-

ומשיניו. . . . . .
. . . . . .
ושם הפלוסוף האיר נרו
על התחלות מופתים ונטה
על יתר החכמות שפרירו.

[101a] *Neveh Shalom* V, 7, f. 75a:

הסוג השלישי היא חכמת האלהות, והוא ידיעת הנמצא במה שהוא נמצא ותארו ומשיניו וחלקותיו, ונכנס בזה ידיעת השכלים הנבדלים וידיעת תארי האל ומציאותו.

[102] *Reshit Hokmah*, p. 53:

וזו החכמה נחלקת לשלשה חלקים, הראשון יחקור הדברים הנמצאים והדברים אשר יקראו להם במה שהם נמצאים. והשני יחקור בו התחלות המופתים בחכמות העיוניות הפרטיות... והשלישי יחקור הנמצאים אשר אינם בגופים (נופים :read) ולא בגופים.

One is not to be tempted to change in this passage אשר יקראו להם to אשר יקרו להם. See above n. 97.

[102a] See Steinschneider in *Monatsschrift* XL, pp. 93–94: "1. Die separaten (מופשטים) Intelligenzen, 2. Die Wesen in Allgemeinen, ohne Rücksichit auf ihre Körperlichkeit oder Unkörperlichkeit, 3. Principien (? התחלות) der Beweise der besonderen speculativen Wissenschaften".

[103] See Dieterici: *Die Logik und Psychologie der Araber*, pp. 15ff, Arabic text. *Idem: Die Abhandlungen der Ichwân Es-Safâ*, p. 251ff.

[104] *Makasid al-Falasifah* II, p. 76. See n. 117.

ferent, necessary and possible,[105] He ends both lists by saying "and the like".

Among the Jewish philosophers we have the following lists:

Israeli: Unity of God. Spiritual beings.[106]

Al-Mukammas: Unity of God. His laws and commandments.[107]

Bahya: God. His law. Intelligible forms, such as soul, intellect and the spiritual beings (i. e., Intelligences or angels).[108]

Judah ha-Levi: His list is divided into two parts, following his two definitions of metaphysics. Under the first definition, he enumerates the following concepts of being *qua* being: Potential and actual, beginning, cause, substance and accident, genus and species, the opposite and the same in species, likeness and difference, unity and plurality.[109] Under the second definition, he enumerates certain general principles belonging to the various other sciences, as follows: "Proof of the existence of the Prime Creator, the nature of the species [i. e., universals]. the relation of intellect [i. e., rational soul] to the Creator, the relation of the [animal] soul to the intellect, the relation of nature [i. e., vegetable soul] to the [animal] soul, the relation of matter and form to nature, the relation of the spheres, stars and other phenomena to matter and form, the wherefore of their being classified in this manner, the wherefore of their being arranged in this order of anteriority and posteriority, the knowledge of things human and divine, of universal nature, of divine providence."[110]

[105] *Ibid.*, p. 77–78. See n. 117.

[106] See above n. 17.

[107] See above n. 23 and 30.

[108] See above n. 31. For "Spiritual beings" Bahya uses the expression האישים הרוחניים; Isaac Israeli: הענינים הרוחניים; Maimonides: השכליים הנפרדים, המלאכים. In Al-Harizi's translation of Honain ben Isaac's *Musare ha-Pilusufim* I, 11, Philosophy, i. e., Metaphysics, is identified with האוהות העליונים: חכמת הפילוסופייה והיא חכמת האותות העליונים. The expression on האוהות העליונים usually means "meteorology." But the suggestion has been made to change it here to האישים העליונים (See Loewenthal: *Honein ibn Ishak, Sinnsprüche der Philosophen*, p. 69, n. 4).

[109] *Cuzari* V, 12. See n. 117.

[110] *Ibid.*
בקיום הבורא הראשון, והנפש הכללית, ואיכות המינים, ומדרגת השכל מהבורא, ומדרגת

Abraham Ibn Ezra: God, psychology, angels, eschatalogy.[111]

Joseph ben Isaac Kimhi: Unity of God. His laws and commandments.[111a]

Maimonides: Divine attributes, angels.[112]

Shem-tob Falaquera in his *Reshit Hokmah* and Afendopolo:[113] They both classify the topic of metaphysics into two groups. The first is presented by them as an analysis of Aristotles' *Metaphysics* and contains the following topics: Being *qua* being, principles of the other sciences and a refutation of the false theories of the ancients, God, the Intelligences, the universe in its relation to God. The second group, called by both of them "branches", contains the following: Prophecy, eschatalogy. Afendopolo adds also soul. In his *De'ot ha-Pilusufim* Falaquera deals only with the Active Intellect.[113a]

Gershon ben Solomon of Arles: Psychology.[114]

Moses da Rieti: Like Judah ha-Levi he arranges the topics of metaphysics under its two definitions which he has reproduced. Under the first definition he enumerates the following: Substance and accident, cause and effect, whole and part (or universal and particular), one and many, potential and actual, prior and posterior, finite and its opposite, necessary and possible.[115] Under the second definition he enumerates the following topics: The immaterial Intelligences, God, His attributes, refutation of erroneous views.

הנפש מהשכל, ומדרגת הטבע מהנפש, ומדרגת ההיולי והצורה מהטבע, ומדרגת הגלגלים והכוכבים וההויות מההיולי והצורה, ולמה הוטבעו על המחלוקת הזאת, והקדימה והאיחור, ידיעת האנושות והאלהות והטבע הכללי והשנחה הראשונה.

[111] See *Yesod Mora* I.

[111a] See quotation above in n. 55a.

[112] See quotation above in n. 100.

[113] *Monatsschrift* XL, pp. 93–94.

[113a] See above n. 65.

[114] See above n. 66.

[115] *Mikdash Me'at* I, 3:

קודם ומתאחר בם יעורב
והבעל תכלית יסותרו,
ומחוייב ואפשר אחר נקרב.

. . . . בעצם ומקרה,
וכמו עלה או אשר יעלל,
כולל וחלקיי, אחד ורב.
ובכח ובפעל שם יתגולל.

Abraham Shalom: Essence and attributes of God, angels, sublunar world, soul, prophecy, eschatalogy.[116]

These topics, as will have been noticed, may be grouped together under the various definitions of metaphysics reproduced above from Aristotle. Some of them are an enumeration of immaterial beings and their attributes, others are general concepts of being *qua* being, still others are principles common to the other sciences.

In Algazali's lists all the topics, sixteen in number, are to be found in the list of terms defined by Aristotle in *Metaphysics* V. Of the fourteen terms given by Judah ha-Levi in the first part of his list, nine are the same as those given by Algazali and the remaining five are to be found in *Metaphysics* V.[117] Thus both lists are based upon *Metaphysics* V.

Similarly, of the sixteen terms enumerated by Moses da Rieti twelve are found in Algazali and Judah ha-Levi and thus go back to the same Aristotelian source. The remaining four are also found in Aristotle, and two of these, *prior* and *posterior*, in *Metaphysics* V (ch. II).

In Israeli and Al-Mukammas there occurs the expression "unity of God" which is to be taken in the general sense of

[116] See quotation above in n. 101a.

[117] The fourteen terms mentioned by Judah ha-Levi are as follows: 1. בכח, באלקוה; 2. בפעל, אלפעל; 3. ההתחלה, אלמבדא; 4. העלה, אלעלה; 5. העצם, אלנוהר; 6. המקרה, אלערץ; 7. הסוג, אלגנס; 8. המין, אלנוע; 9. ההפך, אלמצאדה; 10. ההדומה, אלמנאנסה; 11. ההסכמה, אלאתפאק; 12. החלוף, אלאכתלאף; 13. האחדות, אלוחדיה; 14. הרבוי, אלכתרה.

The seven additional terms mentioned by Algazali are as follows: 15. واجبا, מחוייב. 16. ممكنا, אפשר. 17. معلولا, עלול. 18. كليا, כולל. 19. جزئيا, חלקי. 20. الوجود, המציאות. 21. العدم, ההעדר.

The corresponding Greek terms in *Metaphysics* V are as follows:

1. Ch. 12: *δύναμις*. 3. Ch. 1: *ἀρχή*. 4. Ch. 2: *αἴτον*. 5. Ch. 8: *οὐσία*. 6. Ch. 30: *συμβεβηκός*. 7. Ch. 28: *γένος*. 9. Ch. 10: *ἀντικείμενον*. 10. Ch. 10: *ταὐτά τῷ εἴδει*. 11. Ch. 9: *ὅμοια*. 12. Ch. 9: *διἀφορα*. 13. Ch. 6: *ἕν*. 14. Ch. 6: *πολλά*. 15. Ch. 5: *ἀναγκαῖον*. 16. Ch. 12: *δύναμις*. 18. Ch. 26: *ὅλον*. 19. Ch. 25: *μέρος*. 20. Ch. 7: *τὸ ὄν*. 21. Ch. 22: *στέρησις*.

Only 2, 8 and 17 are not given in the *Metaphysics*. But they are all implied in their antithetical terms.

divine nature or divine attributes as used by Maimonides and others, for the unity of God is the foundation of all discussions of divine nature and attributes. The use of the expression "unity of God" shows the influence of the Motazilite school one of whose chief dogmas was the principle of the absolute unity of God on which account they were called the partisans of unity. Saadia, too, deals with the problem of attributes in a chapter bearing the title of the unity of God.

In some of these lists (Ihwan al-Safa, Judah ha-Levi, Ibn Ezra, Shem-tob Falaquera, Caleb Afendopolo) certain phases of psychology, especially of the higher faculties of the soul, or human psychology *par excellence*, are included in metaphysics. In Aristotle, psychology is part of physics, and so it is also treated by Avicenna and Algazali. The reason for the inclusion of the treatment of the higher faculties of the soul in metaphysics, or rather theology, is probably due to the close relation of the subject to the problems of religion. Gershon ben Solomon, however, includes the entire subject of pyschology under metaphysics.

The inclusion of ethics under theology, noticeable in the Ihwan al-Safa, Al-Mukammas and Bahya, is probably due to the fact that in ethics the works of the pagan authors were supplemented, and sometimes supplanted, by the revealed writings of religion, and religious subjects as a whole, irrespective of their subject matter, were included under theology or metaphysics. It is for this reason, probably, that in some of these classifications the original distinction between theoretical and practical philosophy is not mentioned. Maimonides, who retains the main division of philosophy into theoretical and practical, includes under the latter, as we shall attempt to show, religious legislation as a special branch of practical philosophy in addition to three Aristotelian branches.[118] Thus also Ibn Daud openly appropriates the expression "practical philosophy"

[118] See *Millot ha-Higgayon* XIV:
ולפילוסופים בכל אלו הדברים ספרים הרבה שכבר יצאו בלשון הערב ואולי לא יצאו יותר מהם וכבר הועתקו אל הערבי ושמא אותם שלא הועתקו יותר רבים [Ahitub: והנה אינו צריכים באלו הזמנים אל כל זה, ר'ל החקים הדתות והנמוסים והנהגת האנשים בענינים אלהיים.

and uses it as a designation for certain principles of religious belief and conduct. He says: "Similarly in the second part we shall explain the origin of evil, which we absolutely deny to proceed directly from God, and we shall explain the nature of prophecy and the different kinds thereof, and what are the attendant conditions of a prophet whom we are under obligation to obey, and we shall also explain what is meant by reward and punishment. This is the method which we intend to follow. The subject matter of this sort of inquiry is obviously of the kind known as practical philosophy, for the same subject which in religion is only a matter of revelation is in true philosophy demonstrated by proof".[119] It is for this reason that purely religious precepts which constitutes religious ethics take the place of Aristotle's practical philosophy and are included under theology.

The inclusion of eschatalogical subjects under theology by Abraham Ibn Ezra[120] and Caleb Afendopolo[121] has its parallel in the Ihwan al-Safa.[122] Algazali includes it under physics together with psychology.

Physics is defined by Aristotle as the science which "deals with things which are inseparable from bodies but not immovable",[123] or as he says in another place, "the physicist deals with all the active properties or passive affections belonging to a body of a given sort and the corresponding matter".[124] This definition runs throughout Arabic and Jewish philosophy. Algazali says it deals with "the bodies of the world in so far as they fall under motion, rest and change".[125] Bahya defines it as "the science

[119] See *Emunah Ramah*, General introduction, p. 4:
וגם כן נבאר במאמר השני מקורי הרעות, אשר נכחיש המשכם מהאל ית' בהכלית ההכחשה, ונבאר הנבואה ומיניה, ותנאי הנביא אשר אנחנו מחויבים לשמוע אליו, ונבאר ענין הגמול והעונש. זה אופן הדרך אשר ניחל ללכת בו. אמנם נושא העיון הזה הנה מבואר שהוא פילוסופיא מעשית, מצד היותה בדת מקובלת ובפילוסופיא האמתית מבוארת במופת.

[120] See *Yesod Mora* I.

[121] See *Monatsschrift*, XL, p. 94.

[122] See Dieterici: *Die Logik und Psychologie der Araber*, p. 17; Arabic text, *Idem*: *Die Abhandlungen der 'Ichwân Es-Safâ*, p. 253.

[123] *Metaphysics* VI, 1, 1026a, 13–14.

[124] *De Anima* I, 1, 403b, 10–12.

[125] *Makasid al-Falasifah* II, p. 78.

of the natures of bodies and their accidents".[126] It also underlies the vague statement of Al-Mukammas when he says that it is "the science which investigates the bodies of things and the secrets of their nature".[127] Maimonides narrows down this definition by distinguishing, again after Aristotle,[128] between works of nature and works of art. He says: "The science of physics inquires into bodies which exist by nature and not by the will of man—such as the various species of minerals, plants and animals. The science of physics thus deals with all these bodies and with everything belonging to them, i. e., their accidents, properties and causes, and also with everything under which they fall, as time, space and motion".[129]

In enumerating the topics of physics two methods are used. The first of these is a classification of the physical writings of Aristotle, and this is done in two ways.

Sometimes the physical writings of Aristotle are referred to by their titles. Thus we find it in Judah ibn Matkah,[130] Shem-tob Falaquera, Abraham Shalom,[131] Caleb Afendopolo,[132] and Judah ibn Bulat.[133] They mention among them the following works of Aristotle, which are sometimes spoken of as the eight books of Aristotle's physical writings:[133a] (1) *Physics*, (2) *De Caelo et Mundo*, (3) *De Generatione et Corruptione*, (4) *Meteorologica*, (5) *De Anima*, with which are sometimes coupled some of the works of *Parva Naturalia*, such as *De Sensu et*

[126] See quotaion above in n. 31.

[127] See quotation above in n. 30.

[128] *Metaphysics* VII, 7; XII, 3.

[129] *Millot ha-Higgayon* XIV:

והחכמה הטבעית תעין בנשמים הנמצאים בטבע לא ברצון האדם כמיני המקורים [המחצבים Ahitub:] ומיני הצמחים ומיני בעלי חיים. הנה החכמה הטבעית תעין בכל אלו ובכל מה שימצא בהם, ר"ל במקריהם כלם וסגלותיהם וסבותם, ובכל מה שימצאו הם בו [שימצא בהם בהכרך :Ahitub] כזמן והמקום והתנועה.

See also *Reshit Hokmah*, p. 48ff.

[130] See above n. 64.

[131] See above n. 63.

[132] See above n. 67.

[133] See above n. 69.

[133a] Cf. *Reshit Hokmah*, p. 51:

והספרים המחוברים בשרשים [=בחכמת הטבע] הם שמונה במספר החלקים, וצריך שנזכיר כל אחד מהם בשמו כמו שעשינו בחכמת ההגיון.

Sensibili, *De Memoria et Reminiscentia*, *De Somno*, *De Somniis*, *De Longitudine et Brevitate Vitae*, (6) *Historia Animalium*, and two spurious works, (7) *De Plantis* and (8) *De Mineralibus*.

Sometimes the physical writings of Aristotle, instead of being mentioned by their titles, are referred to by some description of their contents. Thus Judah ha-Levi describes eight of Aristotle's physical writings as follows: "The explanation of physical notions, as matter, form, privation, nature, time, space, motion (*Physics*); spherical and elementary substances (*De Caelo*); absolute generation and corruption (*De Generatione et Corruptione*); generated phenomena, as the phenomena generated in the air (*Meteorologica*), in minerals (*De Mineralibus*) and on the terrestial globe, as plants (*De Plantis*) and animals (*Historia Animalium*); the essence of man and how the soul knows itself (*De Anima*)"[134] The Ihwan al-Safa enumerate only seven of these works, leaving out *De Anima*, which they include under theology, but describing the *Physics* almost like Judah ha-Levi as the science of the principles of things, matter, form, time, space, motion.[135] The topics mentioned in Maimonides' definition of physics quoted above may similarly be taken to refer to some of the writings of Aristotle.

The second method consists in giving an independent list of topics not based upon Aristotle's writings. Thus Alfarabi enumerates the following eight sciences: *scientia de indiciis* (prognostication), *de medicina*, *de nigromantia*, *de imaginibus*, *de agritultura*, *de navigando*, *de alkimia*, *de speculis*.[136] Similar topics are included in the incompleted list given by Algazali, as follows: (1) medicine, (2) talismanics, (3) conjury, (4) magic.[137]

[134] *Cuzari* V, 12:
ובהתברר אמיתת הענינים הטבעיים, בהיולי והצורה, וההעדר, והטבע, והזמן, והמקום, התנועה, והנרמים הגלגליים, והגרמים היסודיים, וההויה וההפסד המוחלטים, וההויות הנולדות ההוות באויר, וההוות במוצאים, וההוות על כדור הארץ מצמח, וחי, ואמתת האדם, ואמתת הצטיירות הנפש את נפשה.

See commentary *Kol Yehudah*, *ad loc.*, followed by Cassel, *ad loc.*

[135] Dieterici: *Die Logik und Psychologie der Araber*, p. 13; Arabic text, *Idem: Die Abhandlungen der Ichwân Es-Safâ*, p. 249.

[136] Baeumker: *Alfarabi*, *Ueber den Ursprung der Wissenschaften* (*De Ortu Scientiarum*), pp. 20 and 12.

[137] *Makasid al-Falasifah* II, p. 78: (1) الطب, הרפואה, (2) الطلسمات, הטלסמאות, (*τέλεσμα*), (3) النارنجات, אחיזת העינים, (4) السحر, הכשוף.

It is interesting to note that these sorts of practical and magical sciences are mentioned by the Ihwan al-Safa in the class of sciences which they describe as preparatory,[138] and that *de speculis* in Alfarabi's list is usually placed under the mathematical arts.

Sometimes these two methods are combined. Thus Shemtob Falaquera,[138a] Moses da Rieti[138b] and Caleb Afendopolo,[138c] after naming the eight works of Aristotle's physical writings, proceed to enumerate the branches (Falaquera and Rieti: ענפים, Afendopolo: סעיפים) of natural science, which branches, remarks Falaquera, are not always mentioned by authors in their classifications of sciences.[139] The branches these three authors mention are on the whole like those given by Alfarabi and Algazali. They all mention medicine, physiognomics, oneirocritics, and alchemy. Rieti has also magic and conjury. Falaquera and Afendopolo include among these also astrology which is given by Rieti and others, and again by Falaquera and Afendopolo themselves, under astronomy. Talismanics, which is omitted here by Rieti, is mentioned by him under the mathematical arts.[140]

As we have already seen, physics is identified with the,

[138] Dieterici: *Die Logik und Psychologie den Araber*, p. 10; Arabic text *Idem: Die Abhandlungen der Ichwân Es-Safâ*, p. 246.

[138a] *Reshit Hokmah*, pp. 48–53

[138b] *Mikdash Me'at* I, 3.

[138c] Cf. Steinschneider in *Monatsschrift* XL, 91–92.

[139] *Reshit Hokmah*, p. 53:

ואלו הענפים לא זכרום מקצת הפילוסופים בזכרם מספר החכמות, ואני כדי שיהיה הספר שלם זכרתים.

These branches are also mentioned by Solomon Almoli in his list which includes physics, medicine, magic, talismanics and alchemy (See above note 70).

[140] The following are the Hebrew terms used by Falaquera, Rieti and Afendopolo for some of the physical sciences they mention:
Physiognomics, F: חכמת ההכרה. R: הכרת הפרצוף. A: חכמת הפרצוף.
Oneirocritics, F and A: חכמת הפתרון. R: פתרון החלומות.
Alchemy, F: אלכיטיאה (or קמייא, כמיאא). R: חכמת הצריפה.
Conjury, R: אוחזי העינים (see below n. 137).
Talismanics: F.: חכמת הצלמים. A: חכמת התרפים והצלמים (See below n. 155d).

science of medicine by Isaac Israeli.[141] A formal division of medicine into hygienics and therapeutics is given by Abba Mari don Astruc.[142] A sevenfold division of medicine is given by Rieti, as follows: Anatomy, pathology, diagnostics, pharmacology, dietetics, hygienics and therapeutics.[142a]

Al-Mukammas places under physics the science of the structure of heaven and earth and the other creatures,[143] which, of course, includes almost everything under the sun.

Unlike both physics and metaphysics with regard to the subject matter of which it treats, but standing midway between these two sciences, is mathematics. Aristotles describes it as a science which, in so far as its subject matter is concerned, partakes both of physics and metaphysics. "The attributes which, though inseparable, are not regarded as properties of a body of a given sort, but are reached by abstraction, fall under the province of the mathematician".[144] In another place he seems to suggest that some branches of mathematics are more like physics, with regard to their subject matter, while others are more like metaphysics. He says: "Mathematics also is theoretical; but whether its subjects are immovable and separable from matter, is not at present clear; it is clear, however, that it considers some mathematical objects *qua* immovable and *qua* separable from matter".[145] It is evidently upon the basis of this passage of Aristotle that Avicenna arranges the

[141] See above n. 17.
[142] See above n. 61.
[142a] *Mikdash Me'at* I, 3

ולה ענף חכמת הרפואה,
אשר תועלותיה ספורים,
ושבעה דרכים למוצאה:

ידיעת נתוח האברים,
הבריאות ומחלות הגופים,
והאותות אשר בהם נכרים,

וסמים ומזונות מתחלפות,
ושמירת בריאות נמשך רצוף,
והסרת החולי בתרופות.

[143] See above n. 30
[144] *De Anima* I, 1, 403d, 12–15.
[145] *Metaphysics* VI, 1, 1026a, 7–10.

seven branches of mathematics in order of their growing dependence upon matter, beginning with (1) arithmetic, which he takes to stand nearest to metaphysics, and following it with (2) geometry, (3) music, (4) the theory of weight, (5) the theory of measure, (6) the theory of perspective, and (7) astronomy, the last of which he takes to be nearest to physics.[146] Aristotle's definition is given also by Algazali.[147] In Maimonides it is reproduced as follows: "The science of mathematics does not investigate bodies *qua* bodies, but investigates the attributes abstracted from bodies".[148] Similar definitions are given by other Jewish authors.

The topics of mathematics are seven according to Avicenna, as already mentioned. Alfarabi[149] gives a similar list, but he counts the theories of measure and weight as one and adds technique. Of these topics the quadrivium of arithmetic, geometry, music and astronomy constitutes the "roots", اصول, שרשים, of mathematics whereas the others are called the "branches", فروع, סעיפים. Thus Algazali[150] and, following him, Afendopolo[151] use these terms of differentiation. Similarly Maimonides designates the quadrivium by the term "roots"[152] (Ibn Tibbon: שרשים, Ahitub: עיקרים) and Moses da Rieti applies the term "branches" ענפים, to the other mathematical topics.

In the enumeration of the topics of mathematics, some authors mention only the quadrivium (Ihwan al-Safa, Israeli, Bahya, Maimonides, Zerahiah Gracian), others mention only part of the quadrivium (Al-Mukammas, Gershon ben Solomon of Arles, Abba Mari Don Astruc, Abraham Shalom), still others mention part of the quadrivium and some "branches" (Joseph Solomon Delmedigo), but there are some who mention not only

[146] See above n. 8.

[147] *Makasid al-Falasifah* II, p. 77.

[148] *Millot ha-Higgayon* XIV.
אמנם החכמה הלמודית לא תעיין בנשמים במה שהם עליו, אבל תעין בעניגים משללים מחמריהם. [Ahitub: מופשטים]

[149] See Hastings' *Enc. of Relig. and Eth.*, IX, p. 881.

[150] *Makasid al-Falasifah* II, p. 78.

[151] See above n. 67. But Caleb Afendopolo uses also שרשית in the general sense of mathematics: חכמה הרגלית או למודית ותקרא גם כן שרשית, *loc. cit*

[152] *Millot ha-Higgayon* XIV.

the quadrivium and the "branches" but many of the subdivisions of the latter (Falaquera, Rieti, Afendopolo).

The list given by Judah ha-Levi presents some difficulty. The published text of the Hebrew translation would seem to offer arithmetic, mechanical measurement, astronomical measurement, musical measurement and optical measurement.[153] The Arabic original,[154] however, and the Oxford text of the Hebrew translation read here arithmetic, musical measurement and optical measurement.

The classifications of the mathematical sciences given by Falaquera in his *Reshit Hokmah* and by Moses da Rieti show a striking similarity.[154a] The former follows Alfarabi in enumerating the quadrivium and the theory of weight, the theory of perspective and technique.[155] The latter omits perspective

[153] *Cuzari* V. 12.
והצטיירות הדברים המוסריים מהמנינים, והשעורים המלאכיים, והשעורים הכוכביים, והשעורים הנגוניים, והשעורים המראיים.

[154] *Cuzari loc. cit.*
ותצור אלאמור אלריאציה מן אלעדדיה ואלהנדסיה אללחניה ואלהנדסיה אלמנאטריה.

[154a] There is also a close similarity between the classifications of these two and that of Afendopolo.

[155] The following are the Hebrew equivalents for these seven mathematical sciences:

Arithmetic. 1. חכמת החשבון. 2. ח' המניין. 3. ח' המספר.

Geometry. 1. תשבורת. 2. ח' המדות. 3. גומטריה. 4. ח' השעורים. 5. הנדסה. 6. ח' המדה והמשקל (See n. 21 Text probably corrupt), 7. ח' הטפחות (See n. 33f). 8. תכונה (See below under Astronomy).

But שעורים and the Arabic هندسة are also used in the general sense of measurement in connection with (mechanics, astronomy), music and aspects. See *Cuzari* V, 12, quoted in n. 153 and 154.

Etymologically, תשברת would seem to be connected with the Arabic root شبر, *to measure by the span.*

The commentary *Kol Yehudah* on *Cuzari, loc. cit.*, takes תשבורת in the sense of *arithmetic*: ועל החשבורת אמר והצטיירות הדברים המוסריים מהמניינים. Steinschneider takes תשבורת in the sense of Algebra (*Jüdische Literatur* in Enoch und Gruber, p. 435).

Astronomy, 1. ח' הכוכבים, علم النجوم (See above n. 31). 2. ח' הגלגל, علم الفلك (See above n. 35, 38). 3. ח' המולות (See above p. 278). 4. ח' התכונה, علم الهيئة, an abridged form of תכונת העולם, هيئة العالم (*Makasid al-Falasifah*

though he mentions it, as does again Falaquera, in enumerating the topics of technique. Both divide each of the quadrivium, with the exception of astronomy, into theoretical, עיוני, and practical, מעשי, which reminds us of the Ihwan al-Safa and Al-Mukammas. Astronomy is subdivided by Falaquera into

II, p. 78, Cf. Steinschneider: *Uebersetzungen* p. 998), i. e., *the disposition or arrangement of the world* (תכונה = هيئة = διάθεσις, See below n. 179. 5. ידיעת צורת הגלגלים (See above n. 63).

According to Samuel ibn Tibbon, תכונה is a general term including astronomy as well as astrology. See *Pirush Meha-Millot Zorot* under לחודים: וחכמת התכונה הכוללת תכונת הגלגלים והכוכבים ומשפטי הכוכבים.

In Al-Harizi's translation of Honain ben Isaac's *Musare ha-Pilusufim* I, 11, there is the following passage:

אהרי כן בשנה רביעית לחכמת החשבון. אחרי כן בשנה החמישית לחכמת התכונה והמדות. אחרי כן בשנה ששית לחכמת הכוכבים. . . . . אחרי כן בשנה שמינית לחכמה המוסיקא היא חכמת הנגון.

It is clear that the passage enumerates the quadrivium. The term תכונה, coupled here with מדה, could not evidently mean astronomy, for the latter is mentioned in חכמת הכוכבים, unless we take תכונה in the specific sense of astronomy and חכמת הכוכבים in the sense of astrology, which, however, does not seem probable. If תכונה here is synonymous with מדה in the sense of "measurement" and hence "geometry", then it must etymologically differ from תכונה which is used for astronomy. We may thus conclude that the term תכונה has two roots:

(1) The Biblical תכונה from כון, *arrange* which, as a translation of the Arabic هيئة, *arrangement, disposition*, is used for astronomy as well as in the expression תכונת הנפש, *disposition of the soul.*

(2) The same word from תכן, *measure*, like the Biblical תכן, תכנית and מתכנת, used here by Al-Harizi as synonymous with מדה (also שעור, תשבורת) in the sense of *measurement* and hence *geometry.*

As a derivative of כון and the equivalent of هيئة the term תכונה has all the meanings of هيئة. It thus also means "exterior", "appearance", "form". Consequently, Samuel ibn Tibbon translates the Arabic אלשכל, "form", "shape", "figure" (*Moreh Nebukim* II, Prop. 22) by התכונה, which Efodi (*ad loc.*) and Crescas (*Or Adonai* I, i, 22) explain by התמונה Al-Harizi translates it by התבנית.

Again, תכונה in its Biblical sense of "fixed place" is made use of by Al-Harizi when he translates the Arabic אוצע, "position" (*Moreh Nebukim, loc. cit.*) by התכונה המיוסדת. Samuel ibn Tibbon translates it by הנחה which is the equivalent of מצב (Cf. *Or Adonai, loc. cit.*).

Music. 1. ח' הנגון or הנגינות. 2. ח' הלחנים (لحون). 3. ח' החבור (See n. 17), i. e., *composition*, as explained in *Millot ha-Higgayon* XIV by

mathematical astronomy, חכמת הכוכבים הלמודית, and astrology. Rieti, too, has this classification but adds a third part, the art of calendar making, which he characterizes as a particularly Jewish art. Rieti uses the following terms in designating these three parts of astronomy: (1) חכמת החזיון, *the science of observation*, i. e., what Falaquera calls "mathematical astronomy". (2) חכמת הנסיון,[155a] *divination* and hence *astrology*. (3) סוד, העבור, *the secret of intercalation*. Both state that it is only the first which properly belongs to mathematics.[155b] Finally, under *technique* Falaquera includes many branches relating to all the mathematical sciences as well as to the various practical

חכמת חבור הנגונים. But why not the Arabic حبر, *music and dance*? As for חבור in the sense of *astronomy*, See above n. 33f. 4. המוצקי, אלמוסיקה, המוסיקא (See n. 17), המוציקא (See n. 72). 5. חכמת הקולות (لحون) (See n. 33f). 6. חכמת העובים (See n. 33f).

Theory of perspective, 1. חכמת המראות or המראים or הראיה (See n. 62). 2. ההבטות or ח' המבטים (Cf. Steinschneider, *Uebersetzubng*, pp. 511–512).

Theory of weight, 1. חכמת הכבדים. 2. ח' המשקולת. (But see *Reshit Hokmah*, p. 47, where the latter is made a branch of the former).

Technique, תחבולות (=حيل). See *Monatsschrift*, XL, p. 93, n. 1.

[155a]. Afendopolo, too, uses חכמת הנסיון for astrology. See *Monatsschrift*, XL, p. 93.

The division of astronomy, חכמת הככבים, into חזיון and מלאכת הנסיון is also found in Abraham bar Hiyya's *Zurat ha-Arez, Introduction*.

As for the etymology of נסיון, Steinschneider seems to take it from the ordinary meaning of נסה, *try*, and translates it by *Erfahrungskunst*. (*Jüdische Literatur* in Ersch und Gruber, p. 435). But it is hard to see why astrology should have been considered as an art based upon experience. It seems to me, therefore, that נסיון should be taken in the sense of ניחוש, *divination*. Thus in Genesis 30, 27, נחשתי is rendered in the Onkelos Targum by נסיתי. Rashi comments upon it: נסיתי בניחוש שלי, and Ibn Ezra says explicitly: נחשתי מפני שראיותיה אינם כמו נסיתי. Thus when Abraham bar Hiyya says of astrology ראיות נכונות וכולם באות מן הסברות לה והנסיונות the term נסיונות is not to be taken to mean "experiences" but rather "conjectures".

[155b] Falaquera: יהחלק השני חכמת הכוכבים הלמודים, וזו היא הנמנית בחכמות הלמודיות.

Rieti: ותקרא חכמת החזיון, ואת אשר בחכמות תתרפק.

Rieti's statement, however, is more reminiscent of Abraham bar Hiyya's characterization of חזיון:

והחלק הזה הוא הנמנה בכל חכמת המדע ומלאכת ההשכל, וכל ראיותיו וטענותיו ישרות ונאמנות שאין בהם שום ספיקא.

arts and crafts. Among those relating to arithmetic and geometry he mentions algebra and the theory of equations.[155c] He also mentions the art of making metrical, astronomical, musical and optical instruments. He also refers to the making of arms and to architecture, sculpture and painting. Rieti gives a similar list but adds talismanics. This is rather strange, for talismanics is usually placed under physics. An explanation for this, however, may be found, if we assume that Rieti was dependent upon the *Reshit Hokmah*, though he does not mention Falaquera among the authors whom he says he has followed in his classification of sciences. Falaquera speaks of a special branch of *technique* which is the working in נטפות וצורות. From the context it is clear that the reference is to sculpture, architecture and painting. He furthermore describes this branch of *technique* as a social art, מלאכה מדינית. Now, the terms צורות and צלמים are often used as the Hebrew equivalents for טלסמאות.[155d] Furthermore in another place Falaquera speaks of astrology (and by the same token of the art of forecasting in general) as a social science, חכמה מדינית (p. 52). It is thus easy to see how Rieti could have taken the following passage of the *Reshit Hokmah*, p. 48:

חכמות תחבולות, והן התחלות המלאכה המדינית המעשית, אשר מלאכתה בנופות והצורות כמו מלאכת הבנין, והדומה לזה.

[155c] *Reshit Hokmah*, p. 47:

ומהם התחבולות החשבוניות על פנים רבים, מהם החכמה הנקראת בלשון הערב אל גבר ואלמקבלה (الجبر والمقابلة) ומה שדומה לה, ואעפ"י שזו החכמה משותפת לחשבון ולחשבורת.

The same Arabic terms are also used by Afendopolo (*Monatsschrift*, XL, p. 93). Similarly in Judah ben Barzilai's *Pirush Sefer Yezirah*, p. 144, the Arabic term for algebra is reproduced without an attempt to translate it into Hebrew.

וכבר דברתי אליהן דבר ארוך בספר אשר כתבתי בחשבונם הנקרא חסאב אלגבאר.

But in *Makasid al-Falasifah* II, p. 78, the Arabic الجبر is translated by the Hebrew חכמת התחבולה. The term תחבולה, as we have seen (n. 155), specifically means *technique* of which Algebra is a subdivision.

[155d] Thus Maimonides *Pirush ha-Mishnah*, *Pesahim* IV: וזו הצורה נקראת בלשון יון טלס"ם. Thus also Samuel ibn Tibbon explains טלסמאות by צורות מדברות (*Moreh Nebukim* I, 63 and cf. Friedlander, *ad loc.*). Afendopolo uses for it the terms התרפים והצלמים (*Monatsschrift* XL, p. 92).

to refer to talismanics and thus paraphrase it by:

ותחבולות נעלמות באות
עם טבע מה וכוח ככבים
בצלמים גם הטלסמאות.

That logic is not to be included among the sciences but is only an instrument of science is dwelt upon by Maimonides, Judah ibn Matkah, Zerahiah Gracian, Moses da Rieti[156] and others. Though Aristotle himself never explicitely designates logic as an organon or instrument,[157] the term is applied to it by Andronicus (early first century B. C.) and Alexander of Aphrodisias (c. 200 A. D.) and is the title by which Aristotle's logical writings have been collectively known. The topics enumerated under logic are usually based upon an enumeration of Aristotle's logical writings which Maimonides says to be eight in number, and gives their titles.[158] The eight books are also named by Alfarabi,[159] Judah ibn Matkah,[160] Falaquera,[160a] Rieti,[160b] and Judah ibn Bulat.[161] All of these authors mention the six books of the Organon: *Categoriae*, *De Interpretatione*. *Analytica Priora*, *Analytica Posteriora*, *Topica*, and *De Sophisticiis Elenchis*, supplemented by the *Rhetorica* and the *Poetica*. Judah ha Levi, here again, instead of naming these eight books

[156] *Millot ha-Higgayon* XIV.:

אמרו מדרנת מלאכת ההגיון מן השכל כמדרגת מלאכת הדקדוק מן הלשון.
ואולם מלאכת ההגיון, הנה אינה אצלם מכלל החכמות, אבל היא כלי לחכמה, אמרו שלא יכשר ללמוד או ללמד על חדר [סדר Ahitub:] כי אם בטלאכת ההגיון, כי היא הכלי לכל דבר ולא מן הדבר.

Serahiah Gracian: Commentary on Proverbs IX, 3:

שלחה נערותיה תקרא על גפי מרמי קרת. זה רמז להקדמות הצריכות לדעת תחלה בחכמות, כמלאכת ההגיון בחכמת הטבע ובאלוהות.

Moses da Rieti: *Mikdash Me'at* I, 3:

ושני כלים להם אתה בוחר, דקדוק הלשון גם ההגיון, כי הם לכל כאניות סוחר.

Judah ibn Matkah: See Steinschneider, *Uebersetzungen*, § 1.

[157] See Grote: *Aristotle* I, p. 78, n. a; Zeller: *Aristotle* I, p. 187; Ueberweg-Praechter: *Geschichte der Philosophie des Altertums*, p. 519.

[158] *Millot ha-Higgayon* X and XIV.

[159] Hastings' *Enc. of Rel. and Eth.* IX, p. 880.

[160] See above n. 64.

[160a] *Reshit Hokmah*, p. 37ff

[160b] *Mikdash Me'at* I, 3.

[161] See above n. 69.

by title, refers to them and also to Porphyry's *Isagoge* by describing their contents, as follows: "Logical truths, as general, species, differences and properties (*Isagoge*); the words (i. e., the ten Categories) both simple (*Categoriae*) and combined in the various ways of combination (*De Interpretatione*); syllogims both true and false (*Analytica Priora*); judgments giving rise to conclusions which are necessary and demonstrative (*Analytica Posteriora*) or only dialectical (*Topica*) or rhetorical (*Rhetorica*) or sophistical (*De Soph. Elench.*) or poetical (*Poetica*)."[162]

In all these lists of logical topics, it will have been noticed, the *Rhetoric* and the *Poetics* are included under logic. This is significant. Aristotle himself considered rhetoric as a branch of dialectics and politics.[163] How he would have classified the *Poetics* is unknown. Probably he would have put it under his productive sciences.[164] The Ihwan al-Safa place poetics among the introductory disciplines, together with reading, writing and grammar,[165] and rhetoric is made by them a part of logic.[166]

We have already pointed out that Aristotle's practical philosophy is often identified with religious law and is thus treated as a part of theology. Still in many formal classifications it is given a place by itself as the counterpart of theoretical philosophy. Whatever we have to say on this subject we shall give here in the form of a running commentary on a passage taken from Maimonides' *Millot ha-Higgayon* XIV. The vague meaning of the passage is clear enough. But we shall try to

[162] *Cuzari* V, 12:
האמתות הדבריות, כמו הסוגים [אלאנאס] והמינים [אלאנואע] והחלקים [אלפצול] והמדות המיוחדות [אלכואץ] והמלות [אלאלפאט] הנפרדות והמורכבות בדרכים הנחלקים מההרכבות, וההקשות המחוברות האמתיות והכוזביות, והגזרות המולידות תולדות הכרחיות מופתיות או נצחויות או הלציות או הטעיות או שיריות.

See commentary *Kol Yehudah*, *ad loc.*, followed by Cassel, *ad loc.*

Exactly the same description of the first five of these books is given by the Ihwan al-Safa. See Dieterici: *Die Logik und Psychologie der Araber*, pp. 12–13; Arabic text, *Idem*: *Die Abhandlungen der Ichwan Es-Safa*, pp. 248–249. See also *Millot ha-Higgayon*, ch. X.

[163] See Zeller: *Aristotle* I, p. 185

[164] See *Ibid.*; Ueberweg-Praechter, *op. cit.* p. 281.

[165] Dieterici: *Die Logik und Psychologie der Araber*, p. 10; Arabic text, *Idem*: *Die Abhandlungen der Ichwân Es-Safâ*, p. 246.

[166] *Ibid.*, p. 11; Arabic text *Ibid.*, p. 245.

determine the precise meaning of its terms, to make a translation of parts of the text and to account for the allusions it contains.

What is generally called practical philosophy, המעשית (Ahitub: המלאכותית), says Maimonides, is also known as "human philosophy", פילוסופיא אנושית, and "political science," החכמה המדינית. Both these additional designations may be found in Aristotle. The expression "political science", *πολιτική*, is sometimes used by him in a general sense and is made to include the science of individual conduct as well as of the state and of the management of a household.[167] Then also Aristotle uses the expression *ἀνθρώπινα φιλοσοφία*, i. e., "the science of human nature", to designate politics in its widest sense.[168]

Practical philosophy is divided by Maimonides into four parts instead of the three of Aristotelian tradition.

The first is ethics which is described as "man's governance of himself", הנהגת האדם נפשו. The term הנהגה (as well as its equivalent נהילה),[169] which may be translated by "management" or "government" reflects the Arabic تدبير or سياسة.[170] All of these terms may be traced to the Greek *νομία* which occurs in *οἰκονομία*. In Arabic and Hebrew, however, the term is also used in connection with ethics and politics and very often by itself as the equivalent of practical philosophy. Thus the Ihwan al-Safa designate practical science by علم السياسة. The expression "of himself" (נפשו) which occurs in Maimonides' definition of ethics, and which is also used by many other authors, may be traced to Aristotle, who, in contrasting ethics with economics and politics, speaks of it as "knowledge for one's self", *τὸ αὑτῷ εἰδέναι*.[171]

Maimonides' description of ethics which follows is a brief but careful summary of Aristotle's theory of virtue, *ἀρετή*. Virtue,

[167] See Zeller: *Aristotle* I, p. 186, n. 4; p. 187, n. 1.

[168] *Ethics* X, 10, 1181b, 15.

[169] See quotation above in n. 33f. From passages quoted by Steinschneder it would seem that the term תקון is also used as the equivalent of הנהגה. See *Uebersetzungen*, p. 209, n. 734b.

[170] *Makasid al-Falasifah* II, p. 75; Dieterici: *Die Abhandlungen der Ichwân Es-Safâ*, p. 252.

[171] *Ehtics* VI. 9. 1141b. 34.

according to Aristotle, is one of the qualities of the soul, but, being neither feeling, *πάθη*, nor capacity, *δύναμις*, it is habit, *ἕξις*.[172] Virtue is not only the result of human actions but, on becoming a habit, it also determines action, for "the virtue of man also must be a habit, from which man becomes good and from which he will perform his work well".[173] The opposite of virtue is vice, *κακία*, and virtue is "a mean state between two vices, one in excess, the other in defect".[174] These two moral qualities, virtue and vice, are dispositions, *διαθέσεις*, of the soul.[175] It is according to their virtues and vices that men are either praised or blamed and are called either good or bad.[176] Just as the soul is divided into an irrational, *ἄλογον*, and a rational, *λόγον ἔχον*, part so are the virtues divided into moral, *ἠθική*, and intellectual, *διανοητική*.[177] Finally, virtue and the moral character of man must be formed by education which is to be enforced by law, *νόμος*.[178]

This composite statement, made up of passages culled from the *Ethics*, is the literary background of the following passage of Maimonides:

"Man's governance of himself is the science which enables him to develop good qualities and to free himself from bad qualities, if he has already acquired them. Moral qualities are dispositions which gradually become more and more fixed in the soul until they are formed into a habit by which actions are determined. Philosophers describe moral qualities as either excellent or defective. Praiseworthy moral qualities are called virtues; blameworthy moral qualities are called vices. Actions resulting from praiseworthy qualities are called good; those resulting from blameworthy qualties are called bad. Similarly philosophers describe reasoning, i. e., the act of conceiving ideas, as either excellent or defective. We thus speak of in-

[172] *Ibid.*, II, 4, 1105a–b.
[173] *Ibid.*, II, 5, 1106a, 22–24.
[174] *Ibid.*, II, 6, 1107a, 2–3.
[175] *Ibid.*, II, 8, 1108b, 11.
[176] *Ibid.*, II, 4, 1105b, 28–1106a, 13.
[177] *Ibid.*, I, 13, 1103a, 3–10
[178] *Ibid.*, X, 10.

tellectual virtues and intellectual vices. The philosophers have many books on the moral virtues. Every rule of conduct by which one man governs another is called law".[179]

Maimonides' description of the other two parts of practical philosophy is similarly an analysis of Aristotle's *Economics* and *Politics*.

The *Economics* of Aristotle begins with a discussion of the relation of husband to wife and of master to slave. He also describes the methods to be employed by a household manager in procuring and preserving property.[180] These methods, he further explains by many illustrations, differ with time and place.[181]

This outline is reproduced by Maimonides as follows:

"The management of a household is the science by which the manager knows how the members of the household are to help each other and how they are to be provided for in such a manner that their affairs would be properly conducted in accordance with the means of the household and in accordance with the established standards of a given time and place."[182]

[179] אמנם הנהגת האדם נפשו, הוא שיפנה אותה אל המדות הנכבדות, ויסיר מטנה הפחיתיות, אם היה שכבר הגיעוה. והמדות הן התכונות הנפשיות שתגענה בנפש עד שעור היותם לקנין [טבע Ahitub:] ותסדרנה מהן פעלות. והפילוסופים יתארו המדות בטעלות ובפחיתיות. ותקראנה המדות החשובות טעלות המדות [מדות טובות Ahitub:] והמדות הטנות פחיתות [מדות מגונות Ahitub:]. והפעלות הבאות מהמדות החשובות תקראנה טובות, והבאות מהמדות המגנות תקראנה רעות. וכן יתארו הדבור גם כן, והיא ציור המשכלות, בטעלות ובפחיתיות. ונאמר מעלות דבוריות ופחיתות דבוריות, ולפילוסופים ספרים רבים במדות. וכל הנהגה ינהיג בה זולתו נקראה חק [הנהגה Ahitub:].

Cf. Rosin: *Die Ethik des Maimonides*, p. 36.

The Greek equivalents of some of the terms in this passage are as follows:

מדות, *ἦθος, manners, moral nature*
תכונה, *διάθεσις, disposition.*
קנין [טבע], *ἕξις, habit.*
מעלות [מדות], *ἀρετή, virtue excellenceé*
פחיתיות [נגות], *κακία, vice.*
דבורי, *διανοητικός, intellectual.*
חק [הנהגה], *νόμος, custom, law, ordinance.*

[180] *Oecon*, I, 6.

[181] *Ibid.* Bk. II.

[182] ואולם הנהגת הבית היא שידע איך יעזרו קצתם את קצתם ובמה יסתפקו עד שיכשר תקון ענינם לפי היכלת ולפי הענינים הראוים בזמן ההוא ובמקום ההוא.

Maimonides' description of politics is a paraphrase of such general statements in Aristotle's *Politics* as that the purpose of society is to attain to some good,[183] and that the best government is that which leads to the attainment of that good,[184] and that there are different kinds of good.[185] Maimonides refers only vaguely to Aristotle's elaborate descriptions and evaluations of the different forms of government.

"As for the governance of the city-state, it is a science which imparts to those who pursue the study thereof the knowledge of true happiness, showing them how to go about in attaining it, also the knowledge of true evil, showing them how to go about in avoiding it, and also the knowledge of how to muster up all their moral qualities in abandoning the pursuit of imaginary happiness to the end that they may have no desire for it and take no pleasure in it. It teaches them also the harmless nature of imaginary evil to the end that they may not be affected by it and that they may take no unnecessary trouble to rid themselves of it. It also prescribes the right methods by which groups of people may organize themselves under a proper form of government."[186]

The fourth class of practical philosophy is described by Maimonides as הנהגת האומה הגדולה או האומות, which would naturally be translated "the government of the great nation or of the nations" and is taken to refer to international politics.[187] The underlying Arabic term for אומה must have been امّة. Later in the passage Maimonides speaks of חכמי האומות השלמות, which, again, would ordinarily be translated "the sages of the perfect nations". However, the Arabic امّة

[183] *Politics* I, 1.

[184] *Ibid.*, VII, 1.

[185] *Ibid.*,

[186] ואולם הנהגת המדינה, הנה היא חכמה תקנה בעליה ידיעת ההצלחה האמתית ותראה להם ההתפשטות [Ahitub: ההליכה] בהנעתה, וידיעת הרעה האמתית ותראה להם ההתפשטות [Ahitub: ההליכה] בשמירה ממנה, והשתטש במדותיהם בעזיבת ההצלחה המדמה עד שלא יתאוו אותה ולא יחיו נפשם בה. ותבאר להם הרעה המדמה עד אשר לא יכאבו בה ולא יעזבו אותה. וכן תניח דרכי הישר יסדרו בם קבוציהם סדור נאה.

[187] See Mendelssohn's commentary *ad loc.* and Rosin: *Die Ethik des Maimonides*, p. 35.

may also mean a "religion" or a "religious sect". It is probably under the influence of this Arabic meaning of the term that the Hebrew אומה was applied to the Karaites.[188] It would also seem that when Saadia says of the Jews that they are a אומה, امّة, by reason of the Torah, he does not simply mean a "nation" but rather a "religious people".[189] In view of this, Maimonides' fourth class of practical philosophy may be translated: "the government of the great religion or of the other religions". By the "great religion" Maimonides undoubtedly means Judaism. Thus also Abraham ibn Daud calls Judaism "the exalted religion", האמונה הרמה, though the term used by him is عقيدة[189a] When Maimonides later speaks of חכמי האומות השלמות, I should take השלמות as a deliberate mistranslation, though not altogether unjustifiable, of the Arabic مسلمات, *Moslem*, and hence: "the sages of the Moslem sects." In suggesting this rendering of האומות השלמות, I am not unmindful of the fact that such expressions as המדינה החשובה[189b] and האומה החסידה,[189c] which occur frequently in philosophical Hebrew literature, usually refer to the ideal state and government as described by Plato and other philosophers. Maimonides' fourth class of practical philosophy will therefore refer to religious legislation, both Jewish and Moslem. My reason for suggesting this interpretation is briefly as follows: There is nothing in Aristotle to correspond to this class of practical philosophy, whereas we do find such a branch of philosophy, described exactly in the same words, in the the works of Moslem authors.

The Ihwan al-Safa, in their five-fold division of practical philosophy, the last three of which are Aristotelian, the first is called السياسة النبويّة, i. e., "prophetic government". It is described as the study "of religious legislations, النواميس, (*νόμος*), that is to say, the agreeable divine law, الشرائع المرضيّة, and

[188] ותלמידי ענן וכו' ועדיין הם בטעותם ונעשו אומה לעצמן.
quoted by Ben Jehuda from *Seder Rab Amram Gaon*.

[189] *Enumot ve-Deot* III, 7: ועוד כי אומתנו איננה אומה כי אם בתורותיה.

[189a] See Steinschneider, *Uebersetzungen*, p. 369.

[189b] Levi ben Gershon: *Milhamot Adonai* II, 2, p. 97.

[189c] Isaac ibn Pulgar: *'Ezer ha-Dat* I, 3, p. 11.

pious customs السنن الزكيّة ".[190] Similarly Alfarabi, in addition to politics, mentions "legislative science, i. e., the science of faith and religiou sduty".[191] The underlying Arabic term for "legislative" here must again be the Greek *νόμος*. Furthermore, in Al-Farani's commentary on a work of Alfarabi, the third class of practical philosophy is subdivided into several parts, one of which is "the science of prophecy and divine law" which is called "legislative science".[192] The term used here, again, is *νόμος*. Maimonides, as will be noticed, also calls this fourth class נמוסים which is again *νόμος*.

From all this it is evident that the fourth class of practical philosophy in Maimonides is the science of religious law, the *νόμος*, of Arabic philosophers. He thus describes it in the following terms:

"Thus the sages of the Moslem sects prescribe customs and usages, each in accordance with his particular belief, and by these their obedient followers guide themselves. These are called religious laws, נמוסים. The different sects are in the habit of regulating their lives according to these religious laws".[193]

The value and importance of each of the sciences is determined not only by the subject matter with which it deals but also by the purpose which it serves. Each science, according to Aristotle, has an end which is called its good, and metaphysics is called the supreme science and the most authoritative of all the sciences because it knows to what end each thing must be done.[194] Unlike all the other sciences, the end of metaphysics, according to Aristotle, is not utilitarian; it is a science which is desirable on its own account and for the mere sake of knowing.[195]

Mediaeval Jewish philosophers, too, speak of the particular end of each science and of the final end of all the sciences[196] which,

[190] Dieterici: *op. cit.* Arabic text, p. 252; German translation, p. 16.

[191] Hastings' *Enc. of Rel. and Eth.*, IX, p. 881.

[192] M. Horten: *Das Buch der Ringsteine Farabis*, pp. 321–322.

[193] וכן חכמי האומות השלמות יניחו הנהגות ודרכים לפי שלמות כל איש מהם, ינהגו בהם עבדיהם הסרים למשמעתם, ויקראו אותם נמוסים. והיו האומות מתנהגים בנמוסים ההם.

[194] *Metaphysics* I, 2, 982b, 4–7

[195] *Ibid.*, 982a. 14–16.

[196] See quotation above in n. 55a and 61.

to them, however, is not, as in Aritsotle, simply knowing for the mere sake of knowing, but knowing God for the sake of knowing and obeying His laws and commandments. Maimonides may affect the Aristotelian manner and begin his discourse by dwelling upon the finality of the contemplative life and upon the superiority of intellectual perfection to moral perfection. But he cannot shake off his belief that obedience to the laws and commandments is indispensable for the life of pure contemplation. He is thus soon forced to admit that the knowledge of God is to be taken to mean the knowledge of God's ways and attributes which ought to serve us as a guide for our actions.[197] Logically, Maimonides could have repeated with Abraham ibn Daud that "the end of all philosophy is right conduct."[198]

This conception of a final end serves as the touchstone by which the particular sciences are tested and evaluated. In Bahya we have a pertinent passage bearing upon this subject. He says: "All the divisions of philosophy as determined by the difference of their subject matter are gates which God has opened to rational beings through which they may attain to a knowledge of the Law and the world. Some of the sciences, however, are more particularly necessary for the understanding of the Law while others are more particularly necessary for the uses of the world. Of those which are more particularly necessary for the world there is first the lowest science, which is the science of the natures of bodies and their accidents, and then the middle science, which is mathematics. These two sciences show the way to all the secrets of this world, its uses, and the advantages that we may gain therein. They also serve as guides to the different arts and crafts which are necessary for the satisfaction of bodily wants and for the acquisition of the various wordly goods. The science which is more particularly necessary for the Law is the highest science, namely, theology. It is our bounden duty to pursue the study of this science in order to attain to a knowledge and understanding of the Law"[199]

Another passage is from Abraham ibn Daud. It is remark-

[197] *Moreh Nebukim* III, 54.

[198] *Emunah Ramah*, General Introduction, p. 4: כי תכליח הפילוסופיא המעשה

[199] *Hobot ha-Lebabot*, Introduction.

able for its freshness and modernity, for its eloquence and worldly wisdom, for its indictment of materialism, pedantry and formalism, for its plea on behalf of the social and liberal aspects of learning and for a higher conception of the religious ideal. Despite its length we shall quote whole sections of it, and with this we shall conclude our paper.

"The sciences are many, ranging one above the other, and the aim of all of them is the knowledge of God. Body is to man only a beast of burden, a stepladder, as it were, by which he may ascend to God. But there are some whose sole ambition is to stuff the beast with plenty of fodder—these are the people whose object in life is eating and drinking. There are others whose desire is to adorn the beast with an ornamental saddle, bridle and blanket—these are the people whose only object in life is to parade in gaudy clothes. Still others waste their entire life in trying to find out what kinds of sickness may befall the beast, how its health may be preserved and how its malady cured, and the nature of herbs and food that are beneficial or hurtful—these are the physicians. I do not mean to say that their art is altogether worthless. Quite the contrary, theirs is an honorable profession, which may do a lot of good in this world now, for through it the worldly life of man may be prolonged so that he may attain perfection and life of a higher kind. This art may also stand its owner in good stead in the world to come, inasmuch as the competent physician may be able to save the lives of God's servants from death and destruction. But I contend that whosoever makes this art the chief aim in life and wastes upon it his entire time does violence to his soul.

There are some who waste their time on something still more worthless, as those who make their chief occupation the art of grammar and of rhetoric, learning it first themselves and then teaching it to others to the end of their days.

Others waste their time in the art of numbers, trying to unravel strange, hypothetical puzzles.....the like of which will never happen, and think that thereby they may be accounted as distinguished arithmeticians. Similarly others waste themselves on the subtleties of geometry. Of these sciences only

that part is truly necessary which leads to a knowledge of astronomy".

The author then tells the story of a slave who was promised freedom and a kingdom if he went on a pilgrimage to a certain holy place. The slave, instead of hurrying to reach his destination and receive his reward, wasted time and unnecessarily prolonged the journey. The author proceeds:

"Like the wasting of too much time on the preparations for the journey is one's excessive devotion to the arts which are mostly of use to the material world, as medicine and law. By this I mean to refer only to a person who wastes his time in the practice of medicine for the sake of picking up fees rather than for the sake of rendering merciful service, or to a person who similarly wastes his time in the practice of law in order to gain a reputation or to amass a fortune or to display his wit. Both of these sciences have something good in common, for both may be useful in alleviating certain evils. Law may do away with some of the unpleasantness that springs up in the mutual relations of men and may establish friendly intercourse among them. By medicine, too, many of the ills resulting from the discordant rheums and from the inclement seasons of the year may be remedied. There is, however, a difference between these two professions. If all men were honest and did no wrong to each other, there would hardly be any need for the legal profession. But without medicine it would never be possible for mankind to get along.....

Like the one who prolongs the journey by making too many unnecessary stops and by pacing slowly with lingering steps is the one who is given too much to the purification of the soul in an effort to cleanse if from the cardinal vices and the offshoot thereof.

Like the arrival at the journey's end is one's attainment of perfection in the knowledge of God".[200]

[200] *Emunah Ramah* II, Introduction, p. 45.

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ADDITIONAL NOTES

To the Article on the Classification of Sciences in Mediaeval Jewish Philosophy Published in the Hebrew Union College Jubilee Volume, Pp. 263–315.

By HARRY AUSTRYN WOLFSON, Harvard University.

P. 266. The confusion of Aristotle's *πρακτική* with his *ποιητική* must have been widespread in Arabic philosophy. Thus the classification given by the unidentified Ali in his *Epistle*, which has been preserved in a Hebrew translation (about which see Steinschneider, *Uebersetzungen*, §204), is based upon the distinction between *theoretical* מלאכת מחשבת and *productive* מלאכת מעשה. The former comprises logic and philosophy in all its main divisions, by which is undoubtedly meant both the *theoretical* and the *practical* philosophy of Aristotle. The latter comprises all the *productive* arts and is subdivided into *commercial* מסחריות and *natural* טבעיות, namely, agriculture, boviculture and hunting, each of these having again many subdivisions.

See אגרת המוסר הכללי לאריסטו in קונטרס דברים עתיקים, ed. Benjacob, Leipzig 1844, p. 15:

אמר עלי הישמעאלי, ואחרי זאת אומר כי המלאכות נחלקות לשני חלקים, חלק מלאכת מחשבת, כגון חכמת הפילוסופיא ושעריה, וחכמת ההגיון ושעריו; וחלק מלאכת מעשה. ומלאכת המעשה נחלקת למלאכות טבעיות ומלאכות מסחריות. והטבעיות הם שלש. הראשונה עבודת האדמה להוציא ממנה המחיה והמזון מאכילה ושתיה. והשנית המרעה אשר ממנה תהיה תועלת המקנה הבקר והצאן. והשלישית מלאכת הציד. ובכל אחת מאלו השלש נכללות מלאכות פרטיות רבות.

The same *Epistle* contains another classification which would seem to be based upon Aristotle's threefold division into *theoretical*, *practical* and *productive*, retaining the distinction between the three divisions but giving the last one a new meaning and content. It appears on pp. 12–13:

ובעבור כי לפעמים יחשוב האדם כי מצא האמת רחוקה ממנו, נצרך השכל למלאכה אשר יכיר בה האמת מן הכזב בכל ענין, ויבחן בה בין הטוב והרע במעשים,

וישכיל בה בין הצדק והשוא בדעות, והחכמ׳ הגידו כי זאת המלאכה היא מלאכת ההגיון. והחכם הגיד כי ההצלחה הגמורה נחלקת לשלשה חלקים: החלק הראשון בדעת יסודות השמים והארץ וכל עניניהם, וכי יש להם סבה ראשונה, והוא הוד כבוד עושה הכל ומנהיגו ית׳ שמו, וכי כח השגחתו פושטת והולכת בהם, ועצמו הוא תכלית היסוד המבוקש מהם; ונחלקים גם כן לשלשה חלקים, חלק למודי וחלק טבעי וחלק אלהי. והחלק השני הוא להכיר ולדעת עניני האדם וכל עסקיו ואיזה מהם הוא הטוב; ונחלק ג״כ לג׳ חלקים, חלק תקון המדות והטבעים, וחלק תקון צרכי הבית, וחלק תקון צרכי המדינה. והחלק השלישי ללמוד [והעניינים] המביאים החכמה. כגון למלאות חוק האמונה וחוק הנפש ולחובות(?) מסגולות [ולהרבות בסגולות :read] החברים והחון והכבוד והממשלת והשם הטוב.

Though the terms for the general main divisions are not given, the underlying scheme of the classification seems to be as follows: [*Propaedeutic*]: Logic. [*Theoretical*]: Mathematics, Physics, Metaphysics. [*Practical*]: Ethics, Economics, Politics. [*Productive*]: Practical rules for conduct in personal, domestic and social life. It is quite obvious that the last is meant to reproduce Aristotle's *productive* arts. The difference between the *Practical* and the *Productive* in this classification is made clear from the context as that between the *descriptive* and the *normative* phases of the sciences of ethics, economics and politics.

P. 268. The Hebrew מוסר as a translation of the Arabic ريا ضى and hence the Greek *προπαιδεία*, or rather *παιδεία*, has its analogy in the Septaugint where מוסר is often translated by *παιδεία*.

P. 274, n. 33f. The conjecture that חבור in the passage of Nissi ben Noah is to be taken in the same technical sense as קבוץ in the expression קבוץ הירח עם החמה finds corroboration in Cuzari IV, 29:

כי לא ישלם בירור הליכת הירח והתחלפות הליכתו לברר עת התחברו (אנתמאעה) עם השמש והוא המולד.

P. 279, n.52. While Algazali, Abraham Ibn Ezra and Afendopolo include astrology under physics, Abraham bar Ḥiyya, Falaquera and Rieti make it a co-ordinate branch of astronomy and put it under mathematics. This difference of opinion may perhaps be traced to Aristotle's question whether astrology (*ἀστρολογία*) is different from physics or is a part of it (*Physics* II, 1, 193b, 26). While *ἀστρολογία* here means "astronomy," it is pos-

sible that it was taken by some in the sense of משפטי احكام النجوم הכוכבים (astrology) instead of חכמת הכוכבים علم النجوم (astronomy).

P. 283, n. 68. A list of Hebrew terms for "secular" sciences has been collected by Dr. Ignácz Hirschler in the Hungarian *Festschrift* in honor of Moses Bloch (pp. 107–114), Budapest 1905. (I am indebted for this reference to Dr. George A. Kohut).

Pp. 283–5. A new classification of the "seven sciences" is given in the poem *Al-Saba'niyyah* by Abu 'Imran Moses Tobi with its Hebrew translation and commentary *Batte ha-Nefesh* by Solomon ben Immanuel Dapiera (published by Hartwig Hirschfeld in the *Report of the Judith Montefiore College*, 1894). The poem speaks of the sciences as being "seven" in number (§30), but the enumeration of the particular sciences in the Hebrew translation does not agree with that of the Arabic original. In the Arabic (p. 20) the seven sciences are: (1) Religion אלעלום אלאדיאן, §25. (2) Medicine עלם אלטב, §25. (3) Physics עלם אלטביעה, §26. (4) Metaphysics ומן בעדה, §26. (5) Logic קאנון אלברהאן, §27. (6) Astronomy עלם אלהאיה, §28. (7) Geometry עלם אלמקדאר, §28.

In the Hebrew translation (pp. 35–38) they are: (1) Theoretical Medicine חכמת הרפואה....חלקה הראשון שהיא החכמה העיונית §25. (2) Practical Medicine כי זה תכלית הרפואה ר"ל המעשה שהוא חלק השני, §25. (3) Physics החכמה הטבעית, ידיעות טבעיות §26. (4) Metaphysics החכמה האלהית, ידיעות אלהיות §26. (5) Logic ההגיון §27. (6) Mathematics למודיות §28. (7) Astronomy חכמת ככבים, §29.

P. 297. In the Iḫwan al-Safa's and Judah ha-Levi's analyses of Aristotle's *Physics* the following topics are enumerated: 1. Matter. 2. Form. (3. Privation). 4. Nature. 5. Time. 6. Space. 7. Motion. The first three topics clearly refer to Book I of the *Physics*, 4 to Book II, 5 and 6 to Book IV, and 7 to Book III. The question may be raised, Why is Book III placed after Book IV and why are Books V—VIII omitted? The answer would seem to be that "Motion" in these analyses does not only refer to Book III but also to Books V—VIII. Aristotle's *Physics* was originally divided into two distinct treatises, the first consisting of Books I—VI (or I—V) and the second of V, VI, VIII (or VI—VIII). Aristotle usually refers to the first group as the *Physics*

or the book *On Nature*, and to the second as the book *On Motion* (See W. D. Ross, *Aristotle*, p. 11). It is also possible that in early Arabic versions of the *Physics* Book III was placed after Book IV together with the other books on motion.

P. 300. Avicenna's characterization of some branches of mathematics as being more closely connected with physics may have its origin in Aristotle's description of perspectives, music and astronomy (literally, astrology) as the more physical branches of mathematics (*Physics* II, 2, 194a, 7–8).

P. 303, n.155. In the Hebrew commentary on the *Al-Sab-a'niyyah* (p. 37) the term משקולות is used in the sense of music: וחכמת המוסיקא והיא חכמת משקלי הלחנים והנינונים, והן חכמת המשקולות נאמר עליהם נעימות וראויות. Literally the expression משקלי הלחנים means "the rhythm of sounds."

P. 303, n.155. The query raised by me as to whether חבור could not be taken as the Arabic جبر is to be dismissed. The explanation in the *Millot ha-Higgayon* XIV: חכמת חבור הנגונים, is not a Hebrew gloss but a translation from an Arabic expression. The expression occurs in the Arabic original of the *Hobot ha-Lebabot* (p. 4, 1.9) تاليف اللحون وهو الموسيقى. The term חבור is a literal translation of the Greek ἁρμονική.

P. 311. In corroboration of my conjecture that Maimonides' fourth branch of practical philosophy is the science of religious legislation called נימוסים we may quote the following passage from Falaquera's *Reshit Hokmah*, pp. 58–59:

וכל זה [i.e. ethics, economics, politics] נזכר בספר אפלטון וארסטו בהנהגה. ומה שהוא נתלה בה מהנבואה והדת כמו שנזכר בספריהם בנימוסים. והפילוסופים אינם רואים מה שיחשבו אותם ההמון כי הנימוס הוא הפיתוי והתחבולה אלא הנימוס אצלם הוא הדין והדבר הקיים ברדת הנבואה, והערביים קורים למלאך המוריד הנבואה נימוס. וזה החלק מהחכמה המעשית תודיע מציאות הנבואה וסגולת כל דת ודת כפי עם ועם וזמן וזמן, וההפרש אשר בין הנבואה האלהית ובין המתנבאים לשקר.

It has already been established that the Arabic ناموس has two etymologies and two distinct meanings: 1. As the Greek *νόμος* it means "law." 2. As an original Arabic word it means "secret" and hence "revelation." (See Dozy, *Supplément aux*

Dictionaries Arabes, under ناموس). These two meanings have often been combined in Arabic, and this passage of Falaquera seems to show that a similar combination of the two meanings had been imported into the Hebrew נימוס (cf. Leopold Dukes, *Philosophisches aus dem Zehnten Jahrhundert*, p. 89, n.5).