Disaster Study Number 2

A Study of Response to The Houston, Texas, Fireworks Explosion

LEWIS M. KILLIAN

With The Assistance Of

RANDOLPH QUICK
FRANK STOCKWELL

Committee on Disaster Studies

National Academy of Sciences—
National Research Council

Publication No. 391

COMMITTEE ON DISASTER STUDIES

The Committee on Disaster Studies is a committee of the Division of Anthropology and Psychology, National Academy of Sciences—National Research Council. It was established as the result of a request made of the Academy—Research Council by the Surgeons General of the Army, the Navy, and the Air Force, that it "conduct a survey and study in the fields of scientific research and development applicable to problems which might result from disasters caused by enemy action."

The function of the Committee is to aid in developing a field of scientific research on the human aspects of disaster. The Committee maintains a clearinghouse on disaster research, publishes a roster of scientific personnel in the field of disaster research, and issues periodically a Newsletter. It makes modest grants to encourage research in disaster studies, advises with responsible officials on problems of human behavior in disaster, and from time to time issues reports on the results of disaster research.

At present its activities are supported by a grant from the Ford Foundation, and by special grants from the National Institute of Mental Health of the Department of Health, Education and Welfare, and from the Federal Civil Defense Administration.

Is This IT?

Photo by courtesy Bob Boiley, Houston, Texas

On June 5, 1953, twenty tons of black pawder exploded in a fireworks warehouse in Houston, Texas. The explosion created a mushroom-shaped cloud and caused extensive blast damage. Same people thought "this is IT".

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Committee on Disaster Studies
Division of Anthropology and Psychology

A Study of Response to THE HOUSTON, TEXAS, FIREWORKS EXPLOSION

by

Lewis M. Killian,
The Florida State University

with the assistance of

Randolph Quick and Frank Stockwell,
The University of Texas

Publication 391
NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL
Washington, D. C.
1956

Library of Congress Catalog
Card No. 56-60014

PREFACE

This is the second in a series of disaster study reports to be published by the Committee on Disaster Studies. This series is designed to make the findings of disaster research more accessible to research workers and to agencies and officials concerned with disaster problems. It includes studies which have been completed for some time but which have not previously been published, as well as recently completed studies. The study reported herein was supported by the Committee under Contract Number DA-49-007-MD-256 between the Department of the Army and the National Academy of Sciences-National Research Council.

This study deals with the cues and the processes of perception and judgment, and the methods of communication which people of Houston, Texas, used to decide what had happened when a fireworks warehouse exploded on June 5, 1953. We believe that the data on these questions will be of value to agencies and research workers concerned with problems of warning, communication, and public information in disaster, as well as to behavioral scientists.

Issuance of this report does not necessarily indicate concurrence of every member of the Committee on Disaster Studies in every statement made in the report, nor does publication imply Department of Defense indorsement of factual accuracy or opinion.

Carlyle F. Jacobsen
Chairman
Committee on Disaster Studies

PREFACE

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THE HOUSTON FIREWORKS EXPLOSION

At 1518 on the afternoon of Friday, 5 June 1953, twenty tons of black powder exploded in a heavily populated area only three miles from the center of the business district of Houston, Texas. Casualties from the explosion were surprisingly few, but this disaster was notable because of the immediate prevalence of the belief that an atomic bomb had been detonated. Although few people were in a position to know the real cause of the blast when it occurred, the belief that it was an atomic bomb was accented by the appearance of a mushroom-shaped cloud above the scene within a few seconds after the explosion. Thus, the relatively unstructured stimulus situation which existed for several minutes after the explosion provided an opportunity for the study of people's reactions to what might have been an atomic attack.

BACKGROUND OF THE DISASTER

Although the city of Houston has an ordinance which prohibits the use of fireworks within the city limits, it had no law, at the time of this disaster, forbidding the manufacture of them. For ten or twelve years the Alco Fireworks Company had been located on Rosine Street, about two miles west of the center of downtown Houston. There were a few other business and small industrial establishments on the same block, but most of the structures were residential. The most vulnerable structures were twenty small, one-story, frame dwellings immediately adjacent to the Alco warehouse. Figure 1 is a map of the area.

The residents of the area immediately surrounding Alco had learned to live with this unusual establishment. Apparently it was not regarded as a source of danger, but sometimes it was felt to be a nuisance, since on one or two holidays the company had sponsored fireworks displays outside the plant. The complacency of the other inhabitants of the area existed because most of them were unaware that two unmarked, corrugated steel buildings, just across an alley from the Alco building, were warehouses in which explosives were stored. On the day of the blast, about 80,000 pounds of black powder were stored in these warehouses.

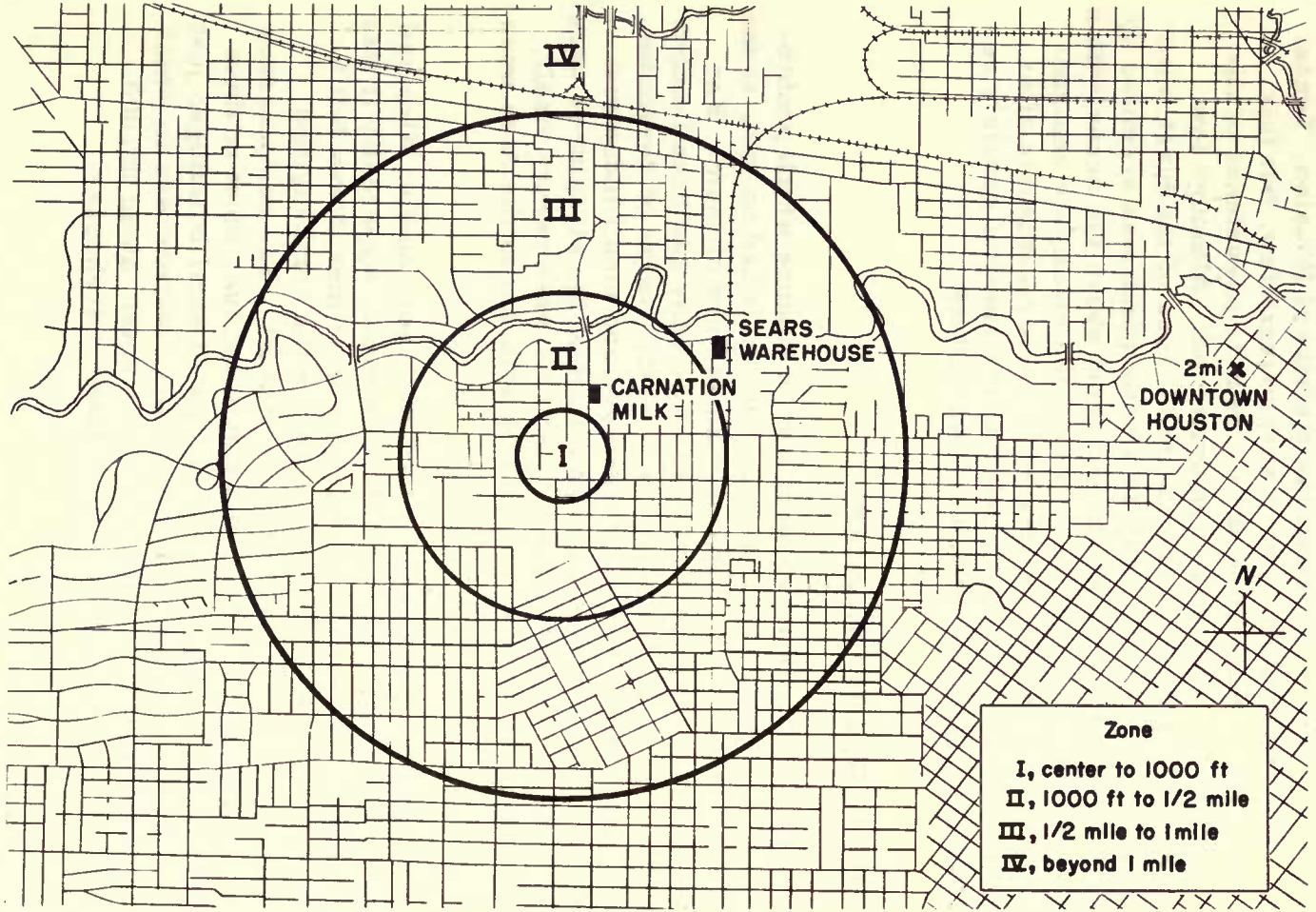

Fig. 1—Map of the Damage Area, Showing Zones of Destruction

Cause of Explosion

Early Friday afternoon an Alco official and an assistant were in one warehouse, assembling fireworks displays by nailing various types of fireworks on boards to form patterns. In the process, one piece was fired, perhaps by percussion, perhaps by a spark from the hammer. It began spewing sparks over the interior of the warehouse. The Alco employees, fully aware of the danger of the situation, fled immediately. They stated to newspaper reporters that in only about fifteen seconds, just after they had cleared the building, the warehouse blew up. An estimated twenty tons of explosives had been detonated.

The Physical Effects

The warehouse simply disintegrated, and pieces of its corrugated steel sides and roof became missiles which rained down on surrounding buildings. The concussion from the blast shattered many windows within a mile radius, and broke some as far as two miles away. Apparently the explosion created an overpressure, for most of the small frame houses on the block were crushed. Finally, there was a thermal effect which ignited combustible materials within at least a 1000-foot radius.

The sound of the explosion is reported to have been heard as far as fifteen miles away. Immediately after the explosion, a mushroom-shaped cloud of white smoke rose above the scene. Within about two minutes, black smoke began to rise and mix with the white cloud. Skyrockets and flares caused numerous flashes of fire within the cloud, and people nearby could hear the continuous popping of fireworks.

Damage was consistently heavy to all but the strongest structures within a radius of almost one-fourth mile. Thirty houses were damaged beyond repair. At least one building at a distance of one-half mile received major structural damage. A Sears, Roebuck and Company warehouse received major damage to the wall facing the point of the explosion.

Injuries and deaths were fewer than they would have been at night or in the early morning, since many of the residents of the area were away from their homes, at work. Four people were killed, two women and two children who were in one of the frame houses nearest the warehouse. Approximately ninety-six people

Photo by Houston (Texas) *Chronicle*

Fig. 2—Aftermath of the blast and the area of primary damage is shown in this aerial photo.

were injured, but most of them received only minor injuries. For instance, forty patients were taken to the Jefferson Davis Memorial Hospital, but only two were admitted. The others were treated for minor cuts and bruises and then dismissed.

The Period of Emergency

This was a highly localized disaster, and the city's normal disaster-fighting forces were able to cope with it without outside assistance. Within about fifteen minutes the police had a traffic control net and emergency communications established.

The traffic control problem was a difficult one. Two freeways which were main thoroughfares passed very near the point of the explosion. Immediately after the blast there was a rush of vehicular and pedestrian traffic to the scene. Beginning about 1630, while fire-fighting operations were still in progress, the afternoon rush of workers going home from downtown Houston had to be routed around the area. Pedestrians who crowded close to the center of damage, either through curiosity or because they lived there, were also a problem. The police finally cleared the block surrounding the center by announcing over a loudspeaker that there was danger of further explosions and that the area must be evacuated.

The Houston Fire Department was able to cope with the fire problem. There was no extensive rescue effort required as most of the injured were evacuated almost immediately after the explosion.

The Role of Civil Defense

The Houston Civil Defense organization played a minor but interesting role in this disaster. This organization had a headquarters in the city hall, with an assistant director and a secretary on duty during the day. The switchboard operator at the city hall is in touch with the Civil Defense organization twenty-four hours a day.

Only a short time before the disaster occurred, the mayor of Houston had publicly announced that the Civil Defense organization would be the central authority in any disaster. They did not actually exercise this authority in this disaster, although the

Upper photo by Houston (Texas) *Chronicle*
Lower photo by Houston (Texas) *Press*

Fig. 3—These two scenes, taken during the height of the conflagration by Houston newspapermen, show the dense black smoke which hindered firemen in getting to the heart of the blaze, and provide a graphic picture of the extent of the damage to the fireworks plant.

assistant director reached the scene within six minutes after the explosion. There he acted in support of the police and fire departments -- in his words, "Finding out what they were doing so that someone would have an over-all perspective."

According to the assistant director, "Civil Defense Headquarters was flooded with telephone calls." For about twenty minutes, many people who called asked whether an A-bomb had exploded. After that, the calls were merely general requests for information.

This informant was asked if he had any idea why many people called Civil Defense Headquarters. He ascribed public reliance on this source of information to intensive publicity given CD planning during the three months prior to this disaster. This included the mayor's announcement that the CD organization would be the central authority in any type of disaster. This publicity had, he said, resulted in the recruitment of 3500 volunteer CD workers in Houston.

The Houston Civil Defense officials learned one valuable lesson from this disaster. They had, as part of their equipment, a communications truck which would have been valuable to the police. At the time of the explosion it was stationed several miles away on the other side of the city, near the Houston ship channel. While it bore Civil Defense markings, it had no siren and no flashing red lights. The CD authorities concluded that, lacking these "traffic-clearing devices," the truck could not be moved across the city in time to be of use during the emergency. The assistant director indicated his intention of equipping all civil defense vehicles with sirens and red lights, and of relocating the equipment in more central positions.

Newspaper Accounts

Houston newspapers gave the disaster extensive and dramatic coverage. They gave particular prominence to the fact that some people had thought the explosion was an A-bomb, and to the mushroom shape of the cloud. On the day after the explosion, the Houston Post carried a page one story with a two-column headline, "Many Feared A-Bomb Fell." On the fifth day after the explosion the Post carried a large cut showing the cloud, accompanied by comments on its resemblance to an "atomic cloud." This cut appeared before interviewing for the present study had begun.

OBJECTIVES OF THE STUDY

The Houston fireworks explosion may be classified as a precipitant but focalized disaster. Because of its focalized nature and the relatively low casualty rate, the opportunities for the study of community reactions to disaster were limited. The outstanding feature, from the standpoint of disaster studies, was the highly unstructured, ambiguous nature of the situation immediately after the explosion. This situation was the result of the fact that the disaster originated from a very unexpected source. Apparently the existence of such a potentially dangerous force in the Alco warehouse was known only to Alco employees. Hence, when the explosion occurred the external part of the frame of reference, at least insofar as it pertained to the cause of the disaster, was unstructured for the great majority of the people who knew only that something had happened. In "guessing" what had happened, and governing their actions accordingly, they were forced to rely largely upon internal factors in their reference frames, perceptual hypotheses or "hunches" as to what it might have been.

The primary questions for research suggested by this situation were, then: (a) How did people perceive the situation? Specifically, how prevalent was the interpretation that an A-bomb had been the source? (b) On what did people base their interpretations, especially the interpretation that it was an A-bomb? (c) How did people who thought it was an A-bomb react to this perceptual structure? (d) How did people find out what really had happened?

METHOD OF STUDY

This study was conducted on the sixth through the tenth days after the disaster occurred, 11 to 15 June 1953. Interviewing of the sample took place on the seventh through the tenth days. All interviews were obtained by three research workers.

The Sample

An area sampling technique was used in the selection of cases for interview. On the basis of a visual survey of the damage, supplemented by the reports of police officials, four zones of physical damage around the center of impact were delineated, as follows:

Zone I. Area of destruction, center to 1000 feet. All buildings which were destroyed were within this zone, although not all buildings within the zone were destroyed.

Zone II. Area of heavy damage, 1000 feet to one-half mile. Damage varied greatly within this zone, but many buildings received extensive damage and almost all of them had much glass breakage.

Zone III. Area of light damage, one-half mile to one mile. Except at the Sears, Roebuck warehouse, almost exactly one-half mile from the center, damage in this area consisted of breakage of glass. Even this was scattered, some buildings escaping with no breakage.

Zone IV. Peripheral zone, beyond one mile. The only damage in this area was scattered breakage of glass near the edge of Zone III. This zone included the downtown business section of Houston.

Subjects were selected at random within these zones from the population that was present on the days the interviews were conducted. A source of bias in the sample selection was the fact that in Zones II and III most of the subjects were drawn from the populations of industrial establishments, which had large numbers of people present on the day of the explosion, i.e., a Carnation Milk plant one-fourth mile from the center in Zone II, and the Sears, Roebuck warehouse one mile from the center in Zone III.

Some people who were interviewed in one zone had been in another zone at the time of the explosion. These subjects were classified according to the zone in which they were located at the time of the explosion. A total of 139 subjects was interviewed. Their locations by zones at the time of the blast are in Table 1.

TABLE 1

DISTRIBUTION OF SAMPLE BY ZONES

Zone	Persons	Percent
I	30	21.6
II	32	23.0
III	53	38.1
IV	24	17.3
All	139	100.0

The ratio of male to female subjects was approximately 2:1, there being ninety-eight males and forty-one females in the sample. Since 134 subjects were white and only five were Negro, no comparison of responses by race was attempted.

The Interviews

A schedule (see App A) was used as a guide in the interviews and for recording responses. Interviews were conducted in an informal manner, the subjects being encouraged to talk freely and spontaneously. Direct questions from the schedule were asked only to keep the interview moving. Because of time limitations, intensive interviews were not attempted. Although open-ended questions were asked, effort was concentrated on obtaining specific answers to the questions on the schedules. Inevitably, however, data not called for by the schedule were obtained.

FINDINGS

The proportion of persons in this sample who indicated that they seriously thought that an A-bomb might have been dropped on Houston was small: eighteen persons, or 13 percent. There were six more persons who thought initially that hostile aircraft had dropped "a bomb," but they did not indicate that they thought it was an atomic bomb.

TABLE 2

PEOPLE'S FIRST IMPRESSION

Supposed source	Persons	Percent
An A-bomb	18	12.9
A conventional bomb	6	4.3
Something very local	60	43.2
The fireworks plant	14	10.0
Just an explosion	9	6.5
Other	22	15.8
No answer or didn't guess	10	7.2
Total	139	100.0

It is quite likely that the newspapers exaggerated the prevalence of this interpretation, since the existence of such fears certainly made this disaster more dramatic. It also may be suspected that the reading of newspaper stories structured the answers of some of those subjects who said, five days after the event, that the first thing they thought of was "an A-bomb." By this time the fact that the cloud from the explosion resembled that resulting from an atomic blast had undoubtedly been well impressed upon the minds of newspaper readers.

The most frequent immediate interpretation of the event was that usually found to be prevalent after explosions -- the thought that something in the immediate vicinity of the subject had blown up. (See Table 2.) A total of sixty respondents reported this as their first interpretation. These sixty subjects constituted 43.2 percent of the entire sample. All but two of them were in Zones I, II, or III, in which nearly all subjects first became aware of the explosion either through feeling the concussion or hearing the sound.

Only about 10 percent of the sample (fourteen persons) knew "from the first" that it was a fireworks explosion, and eight of these knew only because they were in Zone IV and received their first knowledge of the explosion through being told about it. Of the other six persons, four were in Zone I and "guessed" from the location of the blast that it was "the fireworks plant." The other two were in Zone II, and both of them knew that there was a fireworks factory nearby.

TABLE 3

HOW PEOPLE FIRST KNEW
THERE HAD BEEN AN EXPLOSION

Source	Zone				All zones
	I	II	III	IV	
Felt the concussion	9	11	30	1	51
Heard the blast	20	20	21	5	66
Saw the cloud	1	-	1	-	2
Was told by someone else	-	1	1	18	20
Total	30	32	53	24	139

The Bases of Various Interpretations

The task of determining why people perceived the situation in certain ways was largely one of making inferences, although in many cases subjects stated explicitly the basis for their interpretations.

Of the eighteen persons who thought the explosion was an A-bomb, seven gave no specific reason for this interpretation. It was just the first thing that flashed into their minds. The remaining eleven gave various reasons, or answered in such a way that factors predisposing them to this perceptual structure could be inferred. For instance, two subjects, one a schoolboy and one a schoolteacher, had received training at school as to "what to do if an A-bomb is dropped." The schoolboy and a woman who stated that she had recently read about what to do in case of atomic attack, were among the only four persons in the sample who stated that they deliberately took cover according to Civil Defense instructions. It may be inferred that these persons had A-bombs "on their minds" and were predisposed to perceive any explosion as an atomic attack, even in the absence of stimuli specifically suggestive of an A-bomb.

Among the other persons who thought that this was an atomic explosion, six were responding to specific external stimuli which suggested this interpretation to them. Three of them thought that they saw or heard an airplane either just before or just after the explosion. Apparently this suggested an air raid to them. Four persons, including one of those who saw a plane, thought an A-bomb might have been detonated because of the appearance of the cloud. Not only these but others who did not accept the A-bomb hypothesis, stated that the cloud looked just like the ones they had seen in television or movie pictures of atomic tests. As will be pointed out subsequently, it seems that the mushroom-shaped cloud is the feature of an atomic burst that stands out most among persons who witness such bursts indirectly.

The other two persons who thought that the explosion was of atomic origin accepted this interpretation at the suggestion of others.

Another question which might be asked is, "Since some persons thought this was an A-bomb, why did others not think so?" To attempt to ascertain why someone does <u>not</u> think something is a difficult task, but in a few cases subjects were able to make explicit their reasons for not accepting this interpretation, or for

rejecting it after having initially accepted it. These reasons will be referred to as "checks" on the validity of the hypothesis that it was an A-bomb.

Checks on the A-bomb Hypothesis

Of the eighteen subjects who at first thought that an A-bomb had burst, ten very quickly rejected this interpretation because they were in Zone I, and found out what had happened. Another five soon rejected this hypothesis but gave no reason for doing so. It is the reasons given by the other three subjects, and by five subjects who never accepted the A-bomb hypothesis, that are of interest. None of these persons was close enough to the scene to see directly that the Alco warehouse had blown up, but each could hear and feel the explosion and see the cloud. These were the reasons they gave for rejecting the A-bomb hypothesis: "I could see there wasn't as much damage as an A-bomb would have caused." "It just wasn't terrific enough." "When I saw the black smoke coming up in the cloud, I figured it wasn't an A-bomb." "I could see fireworks bursting in the cloud, and then I remembered that Alco was over that way." "I didn't see how there could be any A-bombs around here." "I just can't imagine its happening." "I thought it was too early for them (the Russians) to drop one." "Several reasons. There was just one explosion, and in a raid several bombs would have been dropped. Also, I could tell that the area covered by the explosion was small. And I didn't see any flash." (This subject was an Air Force veteran who had participated in bombing raids using conventional bombs.)

Inspection of these checks suggests that most of them are quite unreliable. Deciding whether an explosion had been caused by an A-bomb, on the basis of the extent of damage visible to the subject, would depend for its validity upon an accurate estimate by the subject of his own distance from ground zero. The mixture of black smoke and explosive missiles with the white "atomic cloud" might result from secondary fires and explosions.

A particularly unreliable check used by three of these subjects was the evaluation of the stimulus in terms of their existing expectations as to what might happen. It is likely that even if an A-bomb had been dropped, these people would not have believed it at first because of their "it can't happen here" attitude.

The most effective check was used by only one subject -- the absence of the brilliant flash which accompanies the burst of an atomic weapon. The emphasis on the cloud rather than on any other feature of an atomic burst, noted previously as a factor in the perception of some subjects who initially accepted the A-bomb hypothesis, suggests that the flash either was not faithfully reproduced in television and film portrayals of atomic explosions, or did not make a significant impression on the audience.

Reactions of Those Who Thought It Was an A-Bomb

Analysis of the initial actions of the eighteen subjects who thought the explosion was an A-bomb reveals no particular pattern to differentiate them from others who were in the same zones with them. Of the eighteen, ten were in Zone I and exhibited reactions which might be expected in the Zone of Destruction regardless of what people thought the source of danger was -- running out of their houses, taking cover to protect themselves from debris, and checking to see if relatives or friends were injured. Some of the other reactions of people accepting the A-bomb hypothesis were quite inconsistent with this hypothesis -- calmly continuing to work, just standing and watching the cloud, or going closer to the point of the explosion! Furthermore, only four of these eighteen subjects stated that they experienced strong fear reactions, not including anxiety about relatives, after the explosion.

Although four out of eighteen subjects, the group accepting the A-bomb hypothesis, is a larger proportion than ten out of 121 subjects, the group rejecting the hypothesis (22.2 percent as opposed to 8.3 percent), this difference might not be significant because of differences in group size. A Chi-Square test bore out this notion in indicating no significant difference.

It may be that many of the subjects who reported that they accepted the A-bomb hypothesis did not really do so. On the other hand, they may have accepted the hypothesis initially but found themselves unable to respond in a manner consistent with it, responding instead to such immediate, comprehensible realities as falling plaster and crying children.

How People Found Out What Had Happened

While the situation was highly unstructured at first, word of what had actually occurred spread quickly. By 1600, less than an hour after the explosion, many people had been close enough to the scene to learn the true source of the blast, the newspapers had extra editions on the streets, and radio and television newscasters were broadcasting fairly accurate accounts. During the first hour, however, numerous rumors as to what had happened circulated. There were reports that various business and industrial establishments had blown up, including the Carnation Milk plant, a rice mill, a filling station, and an electric power transformer station. Some people heard that an airplane had fallen in the city, others that a gasoline tank truck had exploded. It is evident that there was a great deal of activity on the part of Houstonians in trying to find out just what had happened. Subjects in the sample were asked, "How did you first find out just what had happened?"

The different means by which people in the sample found out what had happened, and the number of people who found out by each means, are shown in Table 4.

Detailed analysis of the answers to this question reveals that all of the twelve subjects who "knew from the first" what had happened were in Zones I or II at the time of the blast, as might have been expected. What is notable about these findings is the reliance of well over half the sample on what may be properly labelled "the rumor process" as their source of information, getting word of what happened through word-of-mouth reports, either directly or over the telephone. A minority, less than 20 percent, got their first accurate information from media of mass communication, radio, television, or the press.

It might be argued that it made little difference how these persons got their information, since it was accurate. But the variety of rumors that were reported indicates that much false information was circulating along with the true. The greater frequency of "word of mouth" as the first source of knowledge also suggests that people were not relying upon the media of mass communication for their information, but instead were engaging in a disorderly, verbal "milling" process. Further examination of the protocols reveals that while twenty-three persons found out what had happened from radio or television, only three subjects of the entire 139 went immediately to their radios for information. Far more persons (sixteen), either relied on the telephone or rushed to the scene.

TABLE 4

HOW PEOPLE FOUND OUT WHAT HAPPENED

Source	Persons	Percent
"Guessed" or "Knew from the first"	12	8.6
Went to the scene and found out	8	5.8
Someone I saw told me	65	46.7
Someone telephoned and told me	20	14.4
I telephoned someone who told me	8	5.8
Heard it on radio or TV	23	16.5
Read it in the newspaper	3	2.2
Total	139	100.0

In all, eighteen persons from the sample made telephone calls within the first fifteen minutes after the explosion. The reasons for these calls were analyzed. It was found that seven persons called because they were concerned about relatives or property in the disaster area. One man who was near the scene called his family to tell them he was uninjured. It is questionable whether the reasons why the other ten made their calls, so soon after the explosion, can be justified in the light of the tremendous load of necessary traffic that strikes public communication systems during a disaster. For instance, six persons who were closer to the point of the explosion than were their homes and families, nevertheless called home to find out if their families were injured. Curiosity about what had happened was the only motive three persons could cite, and one woman called her employer's insurance company to tell them that a plate glass window in the store had been broken.

There were twenty-four persons in the sample who, during the first hour after the blast, went as close to the scene of the explosion as they could get. All but one of them moved from Zones II, III, or IV into Zone I. More than half of them, fifteen, had what might be considered legitimate reasons for this action, such as concern for property or relatives in the danger zone. Eight went merely out of curiosity, and one because he "thought he might be able to help." To these nine subjects must be added the woman who couldn't leave her office to go herself but directed a truck driver to go and find out what had happened.

Some telephone calls and some movement to the scene of a disaster must be expected, and some can be reconciled with efficient disaster operations. In some disasters, persons who rush to the scene, whatever their reasons, perform a valuable function as the first rescue workers. At the same time, these persons do increase congestion and sometimes their actions turn out to be maladaptive, in that they hamper the organized operations. While the subjects who engaged in such potentially maladaptive behavior constituted only a small minority of the sample, it would take but a minority of the population of a large city to "jam" telephone switchboards and snarl traffic. This was exactly what happened in Houston.

IMPLICATIONS

It must be recognized that, despite its potentialities for destruction, the Houston fireworks explosion constituted a relatively small, limited disaster. At another time of day, or in a smaller community, its physical, psychological, and social effects might have been more severe and more extensive. Occurring in a large city such as Houston, however, it could only be classified as a focalized disaster.

The precipitant nature of this disaster was its salient feature. The fact that so few persons in Houston knew, before the explosion, that large quantities of black powder were stored in the Alco warehouse meant, in turn, that few were able, initially, to identify the source and the nature of the blast. Perceptually the situation was highly ambiguous or unstructured externally. The fact that it was an explosion of powder, rather than of petroleum or chemicals, and the mushroom shape of the cloud, were stimuli which could be suggestive of an atomic burst.

Only a minority of the sample of 139 subjects, 13 percent, thought that it was an A-bomb, however. The reasons that these eighteen subjects gave for thinking it was an atomic burst fall into four categories: (a) training in defense against atomic attack had made some of them "A-bomb minded;" (b) the shape of the cloud suggested an A-bomb; (c) an airplane had been seen or heard about the time of the blast; and (d) someone else suggested that it was an A-bomb.

The reasons why the other 121 persons rejected the A-bomb hypothesis, arrived at mostly by inference, fall into four categories: (a) they already knew what it was; (b) certain aspects of the

stimulus situation constituted external checks which led them to reject this interpretation; (c) it just didn't seem reasonable; and (d) they thought of some more familiar and likely source of an explosion first.

Of the few subjects who used external checks in rejecting the A-bomb hypothesis, only one used what might be regarded as a valid test: the absence of the tremendous, brilliant flash which accompanies the detonation of an atomic weapon. The others relied on changes in the appearance of the smoke cloud and subjective impressions of the extent of damage. The most important reason for the widespread rejection of the A-bomb hypothesis seems to have been that most people perceived the stimulus in a situational context. In this situational context, many causes, familiar as immediate local hazards, were considered as more likely explanations for an explosion than was the A-bomb. *

The actions of those persons who thought it was an A-bomb, not significantly different from the actions of those who did not, suggest that while this interpretation occurred to them they were unable to assimilate it as a real explanation. Furthermore all but two of them seem to have been unprepared to act in a manner appropriate to such a situation.

The majority of the persons in the sample revealed that they did not rely upon "approved" sources for their information about what had actually happened. Listening to word-of-mouth reports, telephoning someone who might know what had happened, or rushing to the scene, were the most commonly relied on means of finding out the real source of the disaster. Only three subjects went immediately to their radios to seek an explanation.

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*Irving Janis reports that in personal accounts of atomic-bombing experiences, 62 percent of Hiroshima survivors and 76 percent of Nagasaki survivors mentioned "the flash of the explosion." It ranked first in frequency of the three major disaster events which were reported by the majority of the survivors, the other two being the blast effects and the presence of large numbers of casualties. Air War and Emotional Stress, McGraw-Hill, New York, 1951. p 11f.

Meanings for Civil Defense

According to the Assistant Director, the fact that the Houston Civil Defense Office received numerous inquiries immediately after the explosions suggests that this organization has succeeded in making many Houstonians conscious of its existence. The nature of these calls and of those made by some of the people in the sample, points, however, to the need for public education against the indiscriminate use of the telephone in time of disaster. A public which treats its civil defense headquarters, as well as friends, neighbors, newspaper offices, and radio stations, as information services operating for its personal convenience can seriously hamper communications and the operations which depend on them in a disaster.

It is evident that in Houston, and we may surmise in many other cities, the people need education in the principle of reliance on media of mass communication, particularly radio, as approved, authoritative sources of information. An important minority need to be impressed with the importance of staying away from the scene of a disaster.

The factors in individuals' acceptance or rejection of the A-bomb hypothesis in their perception of this unstructured situation have other implications for training and education. It is evident that some persons, from reading about atomic weapons and seeing pictures of atomic bursts, are developing tacit perceptual "hunches" as to how to recognize an atomic explosion. The validity of these hunches as cues for identifying such an explosion is questionable. They seem to emphasize the shape and color of the cloud, and the amount of damage which is visible to the observer. It would be useful to ascertain just what people are learning from movie and television reproductions of atomic tests.

It is also evident that how people perceive these and other perceptual cues is highly dependent upon their expectations as to the likelihood of atomic attack. It is unlikely that this would be important to people in the zones near ground zero in such an attack, but it might be important for people in zones where damage was light. The attitude of "it can't happen here," might occasion a brief but serious delay in the assimilation of the fact of an atomic attack and in the reorientation of the individual with reference to this reality.

It well may be, however, that the private citizen should be discouraged from attempting to decide for himself the nature of any disaster, particularly those producing a highly ambiguous stimulus situation. Perhaps he should be taught, instead, to distrust his own judgments and rely instead, as much as possible, on official sources of information. This would, admittedly, be a difficult task, for it goes against what seems to be the basic tendency of the individual to find meaning as soon as possible in an unstructured situation. Yet the uncontrolled, often irresponsible, restructuring activities of numerous individuals constitute one of the major sources of confusion and disorder in a disaster.

Immediate restructuring activity, "estimating the situation," is more important and more legitimate for the combat soldier, particularly the leader, than it is for the average civilian. If there is a vast explosion somewhere on his part of the battle front, it is important that the soldier know whether it is the result of an atomic weapon. It must be assumed, moreover, that whatever his rank or duties he will try to decide, even if only through an "educated guess."

The same sort of factors which operated in the perception of the Houston explosion by civilians may be expected to operate in the perception of the soldier -- hunches as to what an atomic burst would look like, and evaluation of stimuli in the situational context.

Undoubtedly the direct witnessing of atomic bursts by thousands of soldiers in the Desert Rock tests has provided these men with hunches as to how they would recognize another such burst in a more realistic situation, when they did not know what was coming. The question may be asked, "Would subjects who witnessed such a burst directly, rather than on TV or in movies, have been better able to evaluate the stimuli presented by the Houston explosion than were persons who had not witnessed such bursts?" If they could, this would reveal one positive value of such training.

Of course, such a test could not be conducted. With a questionnaire designed to reveal their conceptions of the salient cues by which an atomic explosion may be identified, soldiers who have actually witnessed an atomic burst could be compared with soldiers who have only seen pictures of a burst.

CONCLUSIONS

1. People tend to give meaning to an event, such as an explosion, within a situational context, which includes their expectation as to whether or not an atomic attack is apt to occur.

2. The present study provides no indication that people have the necessary background to recognize an atomic explosion should one occur.

August 1953

Appendix A

SCHEDULE FOR INTERVIEWS

SCHEDULE FOR INTERVIEWS IN HOUSTON, TEXAS

No. _____

1. Where were you at the time the explosion took place?

2. How did you first know that an explosion had taken place?

3. What was your first thought right after it happened?

4. What was the first thing you did after it happened?

5. After this, what did you do?

6. During this time, were other people around you? What were they doing?

7. About how long after you first knew about the explosion, did you find out just what had happened?

8. How did you find this out?

9. Here is a list of things connected with this explosion which may have made an outstanding impression on you. Please rank them from the most outstanding, "1," to the least outstanding.

___the sound of the explosion
___the vibration caused by the explosion
___the appearance of the cloud of smoke
___not knowing just what had happened
___the damage in the area where you were
___the thought that an atom bomb might have exploded
___not knowing whether relatives or close friends were injured
___rumors you heard
___something not mentioned on this list

10. Please check the appropriate spaces below.

sex: ___male
___female

age: ___15 to 24 years
___25 to 34 years
___35 to 44 years
___45 to 54 years
___55 years or over

occupation: (please state)_____

education: ___less than 5 years
___5 to 8 years
___9 to 12 years
___1 to 3 years of college
___4 years of college
___more than 4 years of college

SCHEDULE FOR INTERVIEWS IN HOUSTON, TEXAS

Tape No. _____

1. Where were you at the time the explosion took place?

2. How did you first know that an explosion had taken place?

3. What was your first thought right after it happened?

4. What was the first thing you did after it happened?

5. After this, what did you do?

6. During this time, were other people around you? What were they doing?

7. About how long after you first knew about the explosion did you find out just what had happened?

8. How did you find this out?

9. Here is a list of things connected with this explosion which may have made an outstanding impression on you. Please rank them from the most outstanding, "1," to the least outstanding.

___ the sound of the explosion
___ the vibration caused by the explosion
___ the appearance of the cloud of smoke
___ not knowing just what had happened
___ the damage in the area where you were
___ the thought that an atom bomb might have exploded
___ not knowing whether relatives or close friends were injured
___ rumors you heard
___ something not mentioned on this list

10. Please check the appropriate spaces below.

sex: ___male ___female

age: ___15 to 24 years
___25 to 34 years
___35 to 44 years
___45 to 54 years
___55 years or over

occupation: (please state) _____

education ___less than 5 years
___5 to 8 years
___9 to 12 years
___1 to 3 years of college
___4 years of college
___more than 4 years of college

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