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EMERGENT BEHAVIOR AT THE EMERGENCY
TIME PERIODS OF DISASTERS

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The Disaster Research Center

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) In the first year of a projected five year study of the behavior of organizations in disasters, the focus was on emergent groups. Other than earlier work by the Disaster Research Center (DRC) there has been little research on the characteristics of and conditions for emergent groups at emergency times. From this earlier work was taken a conceptualization of emergent groups as those which have both new structures and functions. ✓ Data were obtained directly from two in-depth and five		

other field studies; additional data were indirectly gathered through gathered from approximately two dozen other disasters in which there was emergent social phenomena. The major conclusion was that while emergent groups are relatively rare, there is substantial emergent behavior in existing groups. A four fold typology of emergent behavior was derived from the data, and all organized behavior in disasters was seen as taking one of seven different forms. Four factors or conditions associated with emergence were tentatively identified. Among the implications for disaster planning noted, was the need to recognize that emergence is a pervasive feature of organized responses to disasters, that all such emergence is not necessarily dysfunctional, that some kinds of emergence can be preplanned, and that improvisations might actually be built into pre-disaster practices.

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TIME PERIODS OF DISASTERS

Final Report

for

The Federal Emergency Management Agency
Washington, D.C. 20472

Cooperative Agreement EMW-K-0881
FEMA Work Unit 2651F

by

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The Disaster Research Center
The Ohio State University

September 1983

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Emergent Behavior at the Emergency
Time Period of Disasters

INTRODUCTION

When the work reported on in this summary report was initiated, it was visualized as the initiation of a five-year study of the behavior of organizations in the emergency time periods of community disasters. The initial focus in the first year was to be on emergent groups. Through case studies drawn from 6-8 new field studies (the maximum possible under the limited funding available), and a reexamination of data already in the Disaster Research Center (DRC) files, we intended to write at the conclusion of the first year a report: (1) summarizing what we had found about the nature and functioning of emergent groups; (2) suggesting the circumstances which generated the appearance of such groups; and (3) indicating what our findings and observations implied about disaster preparedness and response. As such, and as stated in the proposal to FEMA, the report mentioned was visualized as a progress report about early work on a projected longer run study. More specifically, we said "a progress report will be written providing study methodology, initial impressions, and pointing out what they might suggest for disaster planning and responses." It was also noted that the limited time period and resources involved could not allow for more than a preliminary examination of the problem of emergent groups in the trans-impact time period of localized disasters.

In the pages which follow we provide the indicated progress report, but since it is at the termination of the first year of work, it is called a final report. After giving some background about the study, we present our specific observations, and indicate our general conclusions (there is also an Appendix

which provides some information about our research design).

More specifically, the rest of this summary report has three major sections and subdivisions as follows:

- A. Background
 - 1. The problem of emergence in disasters
 - 2. Prior studies
 - 3. Methodology of this research
 - 4. Data obtained and examined
- B. Specific Observations
 - 1. The two in-depth studies
 - 2. The other field studies
- C. General Conclusions
 - 1. A typology of emergence
 - 2. Factors involved in emergence
 - 3. Implications for disaster planning and response
 - 4. Recommendations for future research

BACKGROUND

1. The problem of emergence in disasters

The emergence of all kinds of new and informal groups at times of disasters has long been casually noted. Non-social science descriptions going back to antiquity frequently mention many ad hoc and temporary groupings being formed after catastrophes. Much more recent social science accounts also often allude to, although almost always in passing, to new groups without preimpact existence, operating in the impact or transemergency time period (see through the years, Form and Nosow, 1958; Bates et al, 1963; Committee on the Alaskan Earthquake, 1970).

In the little attention that has been given to emergent groups, some clues about the nature of the emergent groups are provided. Groups seem to focus on highly emergent relevant tasks such as the coordination of inter-organizational operations, the diffusion of public information, the mobilization of resources, the exercise of authority, the setting of policies, damage

assessment, search and rescue, providing of emergency medical services, handling of the dead, clean up and home repair, etc. but the full range of tasks undertaken is unclear. The emergent groups also appear to be composed of public officials as well as private citizens, as well as at times combinations of the two, plus elements from private organizations, but it is far from clear which possible permutations and combinations will appear in connection with what emergency tasks. With little knowledge about the characteristics of emergent groups, it is not surprising that there are almost no indications in the research literature about the circumstances or conditions which generate such groups (with such hypotheses as are advanced coming not from empirical research studies but from theoretical speculations, e.g., see Quarantelli, 1970; Stallings, 1978).

2. Prior studies

To the extent that any attention has been previously given to the problem, it has been primarily by DRC, and has been given to some emergent groups involving public officials. In fact, two of the very first DRC field studies undertook for the old OCD dealt with emergent and informal coordinating groups of local officials during a flood in Montana (Yutzy, 1964) and after the Indianapolis Coliseum explosion (Drabek, 1968). This work led quickly to the development of a fourfold typology of organized behavior in disasters; namely that there are established, expanding, and extending organizations, and emergent groups in community crises. The typology assumed that all organized behavior could use either old or new social structures and could undertake either old or new tasks (see Quarantelli, 1966). Cross classifying these two dimensions produces four distinct types of organized groupings as follows:

STRUCTURES

		Old	New
TASKS	Old	Type I established	Type II extending
	New	Type III expanding	Type IV emergent

However, while the typology generally guided much of later DRC work on organizations, Type IV or emergent groups never did become the focus of systematic research, either by DRC or anyone else. Only isolated case studies limited to one task in one disaster were sporadically done (e.g., the DRC study of Hershiser and Quarantelli, 1976; on handling the dead in the Rapid City flood, or the non-DRC study by Zurcher on an informal debris cleaning group in the Topeka tornado, 1968).

However, in late 1981 under an NSF grant DRC did launch a study of emergent citizen groups in preimpact and post recovery activities. The study, still underway, focuses only on private citizen groups and excludes the emergency time periods of disaster from attention. For preliminary impressions, see Quarantelli, 1983. In 1979, Drabek and colleagues at the University of Denver under an NSF grant did launch a study of emergent phenomena at the organizational level. They examined the emergence of multi-organizational networks in connection with search and rescue at the time of disasters (see Drabek et al, 1981). This work, while very important, focuses on just one emergency time task, is concerned with emergence at the formal organizational rather than the group level (e.g., it did not deal with teams of citizens who by themselves might form search and rescue teams), and otherwise only peripherally deals with the same kind of emergent phenomena central to our research interest.

3. Methodology of this research

We essentially moved on three fronts when we started our research, using primarily what in sociology is known as a grounded theory approach. First, we spent considerable time in staff meetings addressing the conceptual and theoretical problems involved in studying emergent groupings. The question is a very complicated one, but for our purposes we tentatively settled on a formulation which visualized emergent groups as those which had both new structures and new functions. As will be indicated later this empirically proved to be the extreme case, and as such not as good a focus for study as emergent behavior. We also dealt with the matter of a theoretical framework with which to approach emergent groups. In essence, we fellback on an old DRC formulation which stresses the four Cs--that is, there could be interest in the conditions, the characteristics, the careers, and/or the consequences of the phenomena. A decision was made, which was maintained throughout the study, to concentrate primarily on the characteristics of the phenomena we were examining, and only secondarily on the conditions responsible for the phenomena (matters of careers and consequences we thought too premature to examine in the first year of the work).

Second, we examined, partly in dealing with the conceptual problem of what constituted an emergent group, previous work done by DRC on the problem. This involved not only examining published reports (for example, Yutzy, 1964; Quarantelli, 1966, 1970; Drabek, 1968; Stallings, 1978) but also looking at non-circulated DRC internal memos, as well as primary data (i.e., interviews and participant observer notes) gathered in earlier DRC work on the problem. The possibility, suggested in our initial proposal to FEMA, of using empirical data in our files, to construct historical case studies about emergent groups, was initiated but had to be abandoned. Most of the earlier gathered DRC data on emergent groups had been obtained in the course of other research objectives. The data therefore, while suggestive, could not be used to construct

historical case studies; there were too many descriptive gaps to permit a reconstruction of the emergent process. The attempt and exercise of looking at and considering this data in the DRC files, however, was useful in addressing the conceptual question in part because it indicated that another conceptual model should not be postulated prior to obtaining newer empirical data. (See Appendix A for the topics discussed at staff meetings.)

Third, we decided that since we were going to have to generate more new data than we originally thought we would have to, that it would be wise to have a field research strategy which would give us both some depth and range. To obtain depth, we decided we would try to do at least two very intensive, in-depth studies. That is, we would do extensive field research on two major disasters, hopefully for our purposes, involving the same disaster agent. To get some idea of the range of emergent groups, we also decided to study at least eight other disasters involving as differentiated a range of disaster agents and situations as possible. These would be less systematically studied than those two situations where we did an in-depth study. Thus, our goal was to conduct at least ten field studies, which seemed reasonable given the limits of our personnel and travel resources.

4. Data obtained and examined

New data

At the end of the time period for the project we had conducted two in-depth studies and five other field studies, and examined directly or indirectly about a dozen other possibilities for field work. In that sense, we fell short of meeting our projected goal of ten complete field studies. That we were able to conduct only seven field studies was primarily due to the fact that in the last several months of our project, no disasters happened in the United States which met our research needs. There were disasters but, as pointed out in our quarterly progress reports, on the basis of telephone

inquires to the affected localities, were judged not to have emergent phenomena suitable for our purposes, or seemed to be of insufficient magnitude to warrant what at times would have been very costly expenditures of travel funds (e.g., to go to the west coast of the United States).

The two in-depth studies we undertook looked at emergent group phenomena in the Ft. Wayne, Indiana flood; and in the Salt Lake City, Utah flood. We were able to have DRC field teams go twice to each locality, and to amass several score interviews, considerable documentary material, and other relevant data. (See Appendix B for the field instrument used in the first Salt Lake City field trip.)

The five other field studies involved the following disaster situations: the Coalinga, California earthquake; a flood in New Orleans, Louisiana; a landslide in the Washoe Valley, Nevada; tornadoes/floods in Houston, Texas; and the series of floods in Jackson, Mississippi. In connection with another DRC study, it was possible to do some follow-up work in the tornadoes/floods situations in Houston. (See Appendix B for an example of the kind of field instruments used in these studies and the data sought.)

We also gathered varying degrees of data, in a few cases directly but mostly indirectly, about emergent phenomena in connection with about a dozen other disasters which occurred during the time period of our project. These situations included a toxic chemical incident in Denver, Colorado; the flood situation in Slidell, Louisiana; several flooded communities in Missouri; a mudslide in Farmington, Utah; a coastal erosion episode in Santa Monica, California; and a Taft, Louisiana chemical accident. Special circumstances particularly prevented a direct field study of emergent phenomena in Slidell, which along some lines probably was more prevalent in that disaster than all other situations we studied except for Ft. Wayne and Salt Lake City.

Old data

In going through the DRC primary data repository, six disaster situations provided rich although very uneven data about emergent phenomena. They included the Alaskan earthquake, the Topeka tornado, the Wilkes-Barre flood, the Xenia tornado, floods in Southeastern Pennsylvania, and landslides in California. In addition, we were able to garner some useful insights about emergent phenomena in about a half dozen hazardous chemical emergencies DRC had studied in the field about five years ago.

Overall then, our general findings and observations about emergent groups in disasters are drawn from approximately two dozen and a half different disaster agent situations in different parts of the country. Thus, while we have only two very systematic and focused field studies, and five other focused field studies, we do have a somewhat larger empirical base from which we drew our impressions of emergent phenomena.

For obvious reasons, no quantitative analysis was possible (and we had indicated this probability in our original research proposal). Basically we engaged in different kinds of qualitative analysis, for the most part following the methodology of grounded theory, the most systematic qualitative analysis used in sociology (see Glaser and Strauss, 1965, 1967). Detailed case studies were written on the Fort Wayne and the Salt Lake City disasters. Field reports focusing on emergent phenomena were put together on the other five field studies. Impressions were written up on the other situations directly or indirectly examined (in the case of old data, both the primary data and already prepared reports were used to draw impressions).

SPECIFIC OBSERVATIONS

We will separately present our specific observations derived from our two in-depth studies, and our other field studies. The intent here is primarily descriptive. In the section of the report which follows we present our more analytical findings, including the major conclusion that a better perspective for future research and drawing practical implications would be to focus on emergent behaviors in groups rather than emergent groups. Impressions from our other field work and earlier DRC studies are incorporated into the analytical rather than this more descriptive section of the report.

1. The two in-depth studies

There were both major differences and major similarities in the Fort Wayne and the Salt Lake City flood disasters. In both cases, for example, there was extensive use of volunteers who were collectively mobilized and used. In both instances, also, the major emergency responders had considerable time to prepare for impact, but when the disaster occurred it exceeded their expectations. On the other hand, while there was extensive emergent phenomena, of both a group and of a behavioral nature in Salt Lake City during the emergency period, there was relatively little in Fort Wayne. In Salt Lake City, a highly developed, established, preimpact social structural factor, i.e., the existence of a complex of religiously based social networks of citizens who could be easily mobilized for the emergency, seemed to facilitate emergence. In Fort Wayne, extensive local government pre-flood emergency planning appeared to discourage emergence. If nothing else the differences in the two situations indicates the danger of attempting to generalize from a single disaster experience. In a superficial way these two disasters might appear similar since they both involved the massive use of citizen "volunteers" to respond to a flood emergency. However, in many

respects there were major differences.

In Salt Lake City, major flooding was anticipated weeks before it occurred. However, when it happened, the flooding exceeded expectations. The organized response therefore was both to an anticipated threat and to the actual occurrence. The response in both cases involved the activation of many local emergency and non-emergency organizations, and the participation of private citizens as well in the effort, in particular the use of thousands of volunteers to assist in building a temporary river channel running through the middle of the downtown area so the excess water would not inundate large parts of the city.

There was widespread emergent phenomena in this situation, that is, new organizational arrangements and new organizational activities came into being. Some took the form of new groupings which had not existed before the flood emergency. Others took the form of existing groups; either organizing themselves in new ways and/or undertaking non-traditional tasks. Most took the form of new behaviors and activities within and between organizations.

For example, within the pre-planned command center (the equivalent of an EOC), there emerged an informal grouping of experts drawn from different authority levels of various organizations who provided technical advise. No such grouping existed before the emergency, and had not been pre-planned until the flood threat had developed considerably. Basically, in the terminology of our old typology of organized responses in disasters, there was a new group with a new structure and function (in some although not all respects, this new grouping took the role and the part of the pre-planned and existing Emergency Planning Board). How well this grouping operated is indicated by the fact that the new disaster contingency plans currently being developed in the city are partly being modeled on what happened in the flood

situation. Thus, what was an informal grouping of technical experts in the flood, is being formalized as a need to have pre-designated sets of experts available for different kinds of disasters in the future (e.g., one set of experts for chemical spills, another for earthquakes, etc.).

In addition to the emergence of new groupings, of which the example just cited was simply the more prominent case; some established organizations undertook new tasks or developed new structures (what in our old typology of organized response in disasters are called Type II groups, i.e., extending groups; and Type III groups, i.e., expanding groups). For example, the police and the Mormon Church (or more correctly the Church of the Latter-Day Saints, the LDS), extended their tasks at different time periods preceeding and during the flood disaster. They did things, on a fairly continuous and large scale, which were not part of their normal, everyday operational tasks. Similarly, there were structural alterations within and between some established organizations. For instance, new lines of authority developed in some groups, and certain organizations temporarily assumed direction or control over particular operations of personnel from other organizations (e.g., public works department personnel directed police personnel immediately involved in the construction of the new river channel).

But even more apparent than the new groupings and alterations of structures/functions in existing organizations, was the emergence of much new behavior on the part of almost every group that functioned during the flood situation. For example, many organizations had to change one or more of their normal operating procedures. For instance, the city purchasing department had to temporarily change its procedure for purchasing items; they developed one that was less time consuming and in a sense less bureaucratic. At the height of the emergency, some organizations not normally

working on a shift basis, went to a 24-hour operation. Such a change was not the result of prior planning. Also, lines of communication and authority were partly altered for the duration of the emergency in a number of organizations. In some cases, everyday subordinate units and/or personnel, often because their knowledge or expertise was considered crucial for the situation, were temporarily allowed to make recommendations, issue orders, or even direct what in normal times were superordinate entities or officials. In addition, certain organizations developed and maintained relationships and interactions with other groups with which during normal times they had no contact. The city fire department, for instance, not only engaged in a non-traditional task of information gathering about flood conditions in the streets, and relayed what they knew and what was needed (e.g., sandbags at a particular intersection) back to different organizations at the command post, but also laid out the sandbags when they arrived at the designated place.

In addition, over a period of time, thousands of private citizens collectively participated in the flood fighting effort. Many were not individual volunteers in the usual sense of the term, but members of subunits within the LDS Church which were mobilized for the occasion. In that sense, they were, as some earlier DRC research found, a kind of organizational rather than individual volunteer (for a typology of different kinds of volunteers including the phenomena of organizational volunteers, see Dynes and Quarantelli, 1980). While such organizational volunteers were operating within a clearly defined and traditional pre-disaster organizational structure, much of what they actually did during the flood, represented new and novel behavior for them.

The many different kinds of emergence observed in Salt Lake City were far less visible in Fort Wayne. It is not that there was no emergence in the flood in the latter situation; there was some. Even when there had been much preplanning, established organizations at the height of the emergency sometimes had to make minor modifications of their structures and/or activities. For instance, the street department had to move its base of operation for the sandbagging effort from its own locale to the coliseum, an unplanned action. Women's auxiliary church groups, which had expected to supply food for volunteers, had to obtain far more supplies and use more personnel than they had anticipated. Particularly at the coliseum, much of what went on had an emergent quality to it ranging from the teaching of volunteers of how to fill sandbags to having contests between teams of volunteers from different schools.

There were even a few instances of what we discussed earlier as the emergence of Type IV and Type III organizations. For example, some local unions got involved in food and money drives, shelter operations, and coordination of the cleanup (not traditional labor union tasks). One public shelter was opened, manned, and operated in a neighborhood community service center; mostly apart from the traditional Red Cross operations in this area. In the very early stages of the recovery period of the flood, there even emerged a new group concerned with the cleanup effort.

Nonetheless, the general picture we obtained was of little emergence, certainly far relatively less than observed in Salt Lake City, but also in absolute terms. Even though as many as 30,000 volunteers were used to work on the dike holding the flood waters out of the city, groups and people did the traditional, the planned, and the expected. There is a minor methodological bias built into our field work and it is that DRC personnel were present

during the emergency period in Salt Lake City and could observe emergence, whereas all data from Fort Wayne is derived from interviews and documents which are less likely to report emergence, but this hardly accounts for most of the differences in the two situations. As we shall later discuss, different prior disaster experiences and different kinds of planning seem to account for what we found in these two flood disasters.

2. The five other field studies

In the New Orleans flood situation, the telephone system was completely disrupted for more than eight hours in the center of the city where most local emergency organizations had their headquarters or main base, while floods blocking traffic were occurring in different neighborhoods in the metropolitan area. In addition, there is relatively decentralized overall community disaster planning in New Orleans (e.g., separate EOCs), which suggested to us that there might be some problems of integrating overall interorganizational responses in a major disaster. We found that the situation did generate some emergent behavior. For example, while disaster planning calls for the local Red Cross chapter to open several shelters, the local police department had to undertake some of this task because of the serious difficulties and delays the former organization had in contacting and mobilizing its own personnel responsible for shelter operations. On the other hand, the threat to the city never reached the point of necessitating quick and much interorganizational interaction and coordination; thus, there was not, as there have been in other disasters studied by DRC, the emergence of some overall organizational coordinating group or set of officials coordinating policies of the involved agencies.

In the Coalinga, California earthquake there was both more and less emergence than might have been thought. The fire situation which developed

in the aftermath of the quake led to greater participation in fire fighting activities beyond that which was usual even for a volunteer fire department as existed in Coalinga. Also, officials from five key emergency groups (three local and two from out of town) met in a totally unplanned fashion within an hour after impact, discussed and assessed the situation, and made key decisions such as where to establish a command post from where outside aid could be directed. In contradistinction to the immediate emergency time period the later emergency phase did not provoke as much emergence as might have been expected given the substantially greater than typical convergence of outside groups on the stricken area. The tremendous unplanned convergence of outsiders was never coordinated, integrated, or otherwise organized in any meaningful fashion; and it does not appear that there was very much, if any, emergence at the intergroup or organizational level to deal with the problem.

In the Washoe Valley landslide (or mudslide) in Nevada, there was some ephemeral emergent behavior but no emergent groups. The organized response to the disaster was rather poorly coordinated, and there was a relatively high degree of convergence (e.g., eleven pre-existing search and rescue groups alone), along with very limited and by most criteria poor organizational and community pre-disaster planning. However, once the slide was over and had destroyed seven homes and came close to impacting 35 others, the emergency was over. Thus, while in the words of one observer "they never got their act together," the responders to this disaster were able to afford the luxury of what in the DRC experience of 20 years of field work has to be classified at the organizational level as one of the least well handled disasters it has studied. If the disaster impact had been of any greater magnitude, some kind of emergence would almost seem to have been necessary.

The series of related tornadoes and associated floods which hit in and around Houston, Texas in May 1983 did generate both emergent behavior and emergent groups, although for the area as a whole it was a "marginal" disaster. In most of Houston itself the response was primarily to a moderate level emergency, but in surrounding Harris County certain localities suffered a disaster. What also stands out in this situation was the differential impact on different organizations. Some, such as the county health department with overall responsibilities for over 400 different water systems had to have some of their usual activities temporarily assumed by other groups, whereas other emergency relevant organizations had no disaster demands imposed upon them at all. Elsewhere in the area, a totally unplanned public shelter was established and used by private citizens, even though a planned Red Cross shelter was opened not far away.

Finally, the flood in Jackson, Mississippi was particularly selected for study as a possible extreme case of where perhaps no emergence of any consequence might be expected. The flood event we studied in the area was the last of a series of recurrent floods in the locality; in fact, there had been six floods forcing evacuations just since December 1982 (up to May 1983), and there have been floods in previous years (e.g., the major river involved, the Pearl, reached it highest flood stage in recorded time in April 1979). By almost all criteria used by disaster researchers, the area has a disaster flood subculture that is both a traditional and institutionalized pattern of anticipating and preparing for floods (see Wenger, 1978, for a discussion of disaster subcultures). The greatest part of the individual, organizational, and community responses to the flood we studied did follow rather preplanned and expected paths. There was very little emergence of any kind, with the response pattern coming as close to an ideal case in the real world as DRC has ever encountered of non-emergence in a disaster situation

with major consequences. (The May flood studied forced 6,000 residents to evacuate and resulted in at least 24 million dollars worth of damage.) To the extent there was any emergence, it was minor behavioral emergence in a few groups, but no new group emerged--which is what we had hypothesized before actually doing the field work.

GENERAL CONCLUSIONS

In our conclusions we want first to point out what we consider the most important finding. We went looking for emergent groups and found some. But somewhat unexpectedly we also found that in most of the groups that were not emergent, there was considerable emergent phenomena. Second, we want to note that given the limitations of the study, we were able only to suggest in a very hypothetical way, what might lead to emergent behavior in disasters. We can indicate some facilitating as well as generating conditions, but much is still unclear. Third, despite our limited knowledge, there are some important implications for disaster planning and response in what we found. Emergent behavior should be seen as inevitable in disaster situations, but certain kinds of preparedness activities can maximize the usefulness of such behaviors in emergencies. Finally, future research should focus more on emergent behavior in groups than on emergent groups. Such emergent behavior can be a problem for operational personnel in disasters, but disaster planners could take steps to minimize its appearance if there were greater understanding of the emergence process. But the study of emergent groups should not be completely abandoned because in particular circumstances, such as sudden and catastrophic disasters, it is certain new groups will emerge.

1. A typology of emergence

Earlier we presented a fourfold typology of groupings in disasters (see page four). In our field research, we did find numerable instances of such

groups which could be categorized as falling in one of the four cells.

In fact, the great majority of the groups we saw could be relatively easily identified as being established, extending, expanding, or emergent groups; as specified in the typology.

However, there were many observations we made about the organized responses in disasters, which the old typology did not capture well. For example, established groups often underwent no major alterations in their structures or functions but nonetheless exhibited some temporary or minor emergent qualities. In the New Orleans flood situation for example, routines and disaster planning in many emergency organizations called for much intra and interorganizational communications to be conveyed by telephone. However, because of the situation in the city, such communication was hand carried, a procedure not planned for, and undertaken by personnel who had not either by traditions, routines, or plans, visualized playing the role of a message carrier. There was what we eventually decided to call quasi-emergence in group structure and/or function.

Similarly, in our field studies we noted organizations which carried out old functions or tasks and developed some new structure, and yet did not become an expanding group as suggested by the old typology. The local U.S. Weather Service office in New Orleans, for example, when it lost its telephone lines found itself unable to issue weather bulletins, contact other weather station offices, and indirectly was initially unable to continue its warning function for the general public. A local amateur radio club was brought into the situation and by utilizing a patchwork of radio groups was able to establish contact with the Weather Service Office in Baton Rouge. Essentially, a temporary but effective new social linkage or structure was

put in place. In more technical terms, we had what we have ended up calling structural emergence.

Conversely, we also encountered in our field research, instances of where the group structure was in no way altered or changed, but where a major new task was assumed. As already noted, the police department in New Orleans opened up two public shelters, a task that routinely and by disaster planning, is usually carried out by the local Red Cross chapter. When the latter organization was unable to carry out its function, at least in the early stages of the emergency, the police department opened up two public shelters. But in no way did the police department become an extending organization in the sense suggested by the old typology. Instead we had, in the terminology of our new formulation, task emergence.

Finally, we did find instances of group emergence. Right after the earthquake emergency started there was a very temporary coordinating group in Coalinga involving five key organizations. There was both a new structure and a new function which did emerge, although it took rather fleeting form. As in the old typology, we found that in our newer formulation about emergence, we could continue to call this phenomena, emergent groups or group emergence.

Depicted in a tabular fashion we can identify four types of emergent behavior. As briefly discussed above, we have:

TASKS
OR FUNCTIONS

S T R U C T U R E S		<u>Old</u>	<u>New</u>
	O L D	Quasi- Emergent Behavior	Task Emergence
	N E W	Structural Emergence	Group Emergence

In any given disaster situation, of course, all four types of emergence may be simultaneously present as was the case in the Ft. Wayne and Salt Lake City situations. It is also clear the quasi-emergent behavior is the most frequent and group emergence rather rare. We found the former behavior present to some degree in every case we studied, whereas the latter phenomena only appeared in some instances. A reexamination of the previously gathered DRC data alluded to earlier confirmed this impression. It also does appear that task emergence is more frequent than structural emergence, probably reflecting the fact social structure is less vulnerable to change than social task or function, as can be witnessed in many areas of social life quite distant from the disaster area.

To emphasize the importance of emergent behavior in groups that operate in disasters, is not to deny that new groups which emerge in disasters can also be very important. As said earlier (on page 17), sudden and catastrophic disasters do generate emergent groups (this has been consistently documented through 20 years of DRC field work, starting with the Vaiont Dam, Alaskan earthquake, and Topeka tornado disasters of the 1960's, and the Wilkes-Barre flood and Xenia tornado disasters of the 1970's, to cite some major examples). In such catastrophic situations, the emergent groups often are crucial, for instance, in undertaking tasks or providing structures which cannot be done by existing groups even if they expand their functions or extend their structures (see chart on page 4). All this is well-known to anyone familiar with the DRC studies and publications of the last two decades. However, specific attention is recalled to the importance of emergent groups in disasters, so that our emphasis in this report stemming from our latest work, is not misread as in any way disputing the importance of emergent groups in bringing greater efficiency and effectiveness to disaster responses especially of the more catastrophic kind. Since neither the Ft. Wayne nor the Salt Lake

City disasters fell into the catastrophic category as the five mentioned above, the work reported cannot be used to directly substantiate the point of this paragraph which rests on an earlier and different empirical base (for publications relevant to the matter just discussed, see Quarantelli's 100-item annotated bibliography on disaster and disaster planning, 1980).

Nonetheless, we did take the findings from earlier DRC studies on emergence (e.g., Yutzy, 1964; Quarantelli, 1966; Quarantelli and Dynes, 1967; Dynes, 1968; Dynes and Quarantelli, 1968; Adams, 1969; Anderson, 1969; Parr, 1970; Quarantelli, 1970; Stallings, 1970; Quarantelli and Dynes, 1970; Brouillette and Quarantelli, 1971; Weller and Quarantelli, 1973; Taylor, 1974; Ross and Smith, 1974; Bardo, 1978; Forrest, 1979; Dynes and Aguirre, 1979; Ross, 1980; Dynes and Quarantelli, 1980) and combined them with the results from the work being summarized in this report, and have concluded that organized responses to disasters can be visualized as taking one of the following forms:

1. Established groups carrying out old tasks (old Typology Type I)
2. Established groups carrying out old tasks but with some degree of minor behavioral emergence, either structurally or functionally, in their activities
3. Established groups carrying out new tasks and showing behavioral task emergence
4. Established groups carrying out old tasks but showing behavioral structural emergence
5. Extending groups carrying out old tasks but with new structures (old Typology Type II)
6. Expanding groups carrying out new tasks but with old structures (old Typology Type III)
7. Emergent groups carrying out new tasks with new structures (old Typology Type IV)

Both Bardo (1978) and Stallings (1978) in earlier analyses involving reexamination of previously gathered DRC data, indicated the initial four-fold typology of organized responses to disasters advanced by DRC, was too limited an approach. Our more recent empirically based work confirms their suggestions that an expansion of the typology was needed. The newer formulation with its emphasis on minor behavioral as well as major structural and functional emergence, in addition to group emergence, does seem to more

adequately capture social reality than the original fourfold typology of different groups.

2. Factors involved in emergence

Defining or identifying the characteristics of a phenomena is of course simply a necessary but only preliminary step to answering a more important question: What conditions account for the phenomena observed? In our particular study, the basic question therefore is what are the conditions which are responsible for emergence at times of disasters and the different forms (i.e., behaviors and groups) that the emergence takes? Since most of our research effort was focused on ascertaining the characteristics of emergence, at this point we can only advance a few tentative ideas about the conditions which are involved. For purposes of exposition, we will group our remarks around four ideas and state them in an unqualified way.

1. If the situation is perceived as requiring immediate action to avoid further problems, there will be some efforts at emergence.

This is consistent with the frequently expressed view in the disaster research literature that if something needs to be done especially at the height of an emergency, people and organizations will attempt to do something. If they cannot do it with their traditional ways of doing things, an effort will be made to develop new ways. Thus, if the police department cannot handle the problem in the way they usually do, the organization will organize itself to do it a different way (e.g., calling in all shifts, going to 12-hour shifts, mobilizing reserves, deputizing civilians, etc.). Also, if non-routine problems develop, an effort will be made to deal with them. Thus, if a stricken neighborhood finds itself faced with the possibility that many injured may be laying around or trapped underneath debris, the civilians in the area will informally organize themselves into teams to engage in a very non-routine

task, the search and rescue of victims. The efforts, whether by organizations and/or individuals, may not be very effective and/or efficient, but there will be an effort. Overall then, it can be said that a necessary condition for emergence is a perceived need to act on urgent matters (e.g., this seemed to be lacking in the Washoe Valley mudslide disaster).

2. While a perceived need for action is a necessary condition, the sufficient condition for emergence is a facilitating social context.

Here again, the observation is consistent with findings from other disaster research. Individuals and groups may perceive that something should be done, but because of lack of required knowledge, crucial resources, or some other important facilitating factor may be unable to act. Threatened individuals may believe they should quickly evacuate, but lack the boats necessary to get out of a flooded neighborhood. Emergency organizations may perceive they should immediately move to deal with a toxic chemical threat, but have no information on the nature of the threat; or if known, what concrete steps could actually be taken. Put another way, a perceived need to act may not co-exist with the possibility of acting. Thus, the possibility of engaging in new behaviors or developing new groups is dependent on whether the existing social context can provide the means for acting in ways different from the old. Search and rescue teams may emerge, but if heavy duty earth moving machinery is required to remove debris, such emergent groups will falter and dissolve. Conversely, if there is a perceived need and a facilitating social context some emergence will occur (e.g., in Coalinga, the fire department needed far more "volunteers" than usual to help fight a major fire, and was able to use civilians that were present).

3. Prior planning can preclude dysfunctional or unnecessary emergence.

Without assuming that emergent behaviors or groups are necessarily and always dysfunctional or bad in a disaster response (a point we discuss later),

it does appear that prior planning can preclude or discourage emergence. In some ways, this is simply saying that if prior planning is such as to generate certain kinds of emergency responses, there will be no need for such responses to emerge more spontaneously and informally. On the other hand, if something is prepared ahead of time, it should in most cases, be a more efficient and effective way of responding than where the response is created as the situation is developing. (As an example, the more extensive and longer planning that went into preparing for the Ft. Wayne flood allowed it to be a more efficient response than what happened in Salt Lake City where because of relatively lesser planning, more "ad hocing," and "ad libbing" had to be undertaken as the threat developed.)

4. Prior disaster experiences which result in preplanning will make emergence at an emergency time less likely.

When there is a high degree of preparedness, as said above, it can preclude emergence. While disaster research is clear on the fact that experience of a disaster does not automatically lead to more or better planning for future disasters (Anderson, 1969; Wright, 1978), experience plus other conditions, can lead to taking of preparedness measures (Weller, 1974; Wright, 1978). (E.g., it was not so much that Jackson, Mississippi had had many floods that was crucial, but rather that it had undertaken such extensive preparedness that when the last flood occurred, almost everything had been foreseen.) Too often it is assumed that as a result of a disaster experience, the next emergency will be handled in a better way. This is not necessarily true unless the lessons from the experience are explicitly incorporated into the planning process (see also Quarantelli, 1982).

In the preceeding sections we have sketched out the dimensions of a typology of emergent behavior and have sketchily outlined some very general conditions which might serve to facilitate and generate emergent behavior. This may serve the purpose of an overall summary report such as this one, but work has already been initiated on a more systematic and specific depiction of the characteristics of and conditions for the appearance of emergent behaviors and groups at emergency time periods of disasters. A final version will be prepared for eventual publication in some professional journal.

3. Implications for disaster planning and response

If what has been said is valid, what implications are there for disaster planning and response? A number are obvious. But instead of listing those, we prefer to mention some that may be less self evident; some general, often interrelated points that in the DRC experience are often at variance with the views held by many disaster planners and operational personnel.

(1) Emergent phenomena, that is, new social arrangements and activities, are a pervasive feature of organized responses to disasters, although the manifestation may range from minor behaviors to major groups. As such, disaster planners and operational personnel should take the appearance of the phenomena for granted and incorporate the probability of its presence into their thinking and acting. Just assuming the phenomena will occur will be helpful, for disaster research has consistently shown that one of the most disturbing aspects of disasters for emergency responders is the appearance of phenomena which they had not anticipated in their planning. It is impossible to foresee everything, but there is no good reason for not anticipating the probable.

(2) Related to the first point is the necessity of not automatically assuming that emergent phenomena is necessarily dysfunctional, bad, or otherwise inappropriate as disaster research has also noted. There is a strong tendency among disaster planners and responders to think that because they have not planned for or are not controlling some phenomena in a disaster situation, that it cannot be good. This is seldom the case. In many situations, whether its is emergence on the part of individuals or organizations, the new behavior or group may represent the most effective and efficient way of coping with problems. This is not to say that emergence always represents the best solution, but emergence does represent an effort to solve problems.

(3) In this connection, planners and responders should consider under what circumstances and for what purposes they might actually want to facilitate certain kinds of emergences. A case in point is the phenomena of volunteers and volunteering. As the disaster literature has noted, in most disasters volunteers frequently are more of a problem than a help. Volunteering does represent individual emergent behavior, but most disaster planners and even more so emergency operational personnel, in many cases discourage it unless they can force such behavior along very limited or particular lines. It might be more appropriate to try to anticipate along what lines volunteering might unfold, and plan accordingly, facilitating and taking advantage of what will occur anyway. This same point can be made about emergence at the organizational level as at the individual level.

(4) Certain kinds of emergence can be preplanned, at least in the sense of anticipating the phenomena and creating conditions for its possible appearance. As said earlier, a facilitating social context is required as

well as perceived need for action for emergence to occur. Such a context is something disaster planners could often prepare considerably ahead of any disaster impact, but as some of our examples show, can even be done during emergency times. In this respect, our view here comes close to a similar idea expressed by Drabek (forthcoming). On the basis of his research he argues that a great deal of improvisation is always necessary in organizational responses to emergencies because every disaster presents a particular set of combinations of demands and problems. Given this, he states that emergency managers should welcome, for example, a "loose coupling" between their organizations in the response, because such looseness is actually functional, at least for effectiveness of response. Our research comes to the same general conclusion, but with the additional emphasis that disaster preparedness itself must build in and allow for improvisation or emergence. It makes little sense to plan, to conduct exercises or otherwise carry out preparedness measures as if there was only one standardized way to do such matters, when there is prior acceptance of the probability and usefulness of emergence in the emergency response. If there is going to be emergence in responses to disasters, there should also be a degree of emergence in preparedness itself. Put another way, if responders are going to have to improvise in responding, they should practice some improvising in their preparedness activities.

Overall, then, we are suggesting that among the major implications of our study are that disaster planners and responders should assume emergent behavior will occur, that they not see such phenomena as necessarily bad, that certain kinds of emergence might be encouraged, and that thought should be given to creating improvisations in planning so that practice will be acquired for improving or generating and facilitating the different kinds of emergent

behaviors and groups which will appear at the emergency time periods of disasters.

4. Recommendations for future research

Rather than more research, what is needed is better research. In line with that we make but four recommendations. They deal respectively with a theoretical, a substantive, and two methodological issues.

There needs to be greater attention paid to conceptualizing and clarifying what is meant by emergent phenomena. There has been some progress on this problem. Much of what disaster researchers treat as emergent phenomena, and the finer breakdowns of the phenomena as we have discussed in this report, tends to be treated by policy, planning, and operational officials in the emergency area simply and homogeneously as behavior by individuals or groups which had not been planned for in the situation. Researchers have shown the phenomena is complex but that there are certain general patterns underneath a bewildering array of specific actions. However, there needs to be further conceptual clarification and the development of typologies to capture the differentiated aspects of the phenomena. In short, we still do not know enough about the characteristics of emergent phenomena in disasters, particularly about emergent behaviors.

We need even more attention to be paid to what generates and facilitates the appearance of emergent behaviors and groups. That we could only sketch out in the most general terms the conditions involved in the generation of emergent phenomena, is a testimony of how little researchers know about the question. Until we can answer why there is emergent behavior and what accounts for the differentiated forms the phenomena takes, we will have little understanding and will be able to point out very few theoretical or practical

implications. One central question about conditions would be: What are the crucial factors involved in the generation of emergent groups, that is a new social form with a new social task? If a situation requires the generation of a totally new social entity with a totally new function, it does not seem amiss to speculate that there is something very important about such a situation where apparently old social patterns are inappropriate or cannot work. It could be particularly hypothesized that suddenly catastrophic situations would especially necessitate new social entities, but at the moment there is little evidence one way or the other on this substantive issue.

Third, a methodological issue resurfaced by our field work (especially in the two in-depth studies) was the tendency of informants and respondents, the greater the time away from the actual event, to report activities as they usually or normally should have been, rather than as they actually were at the time. For example, our field observers clearly saw public works department personnel directing many of the river canal building and sandbagging activities of police and fire personnel in the streets of Salt Lake City. Yet this phenomena was not as clearly reported and organizational autonomy was given greater prominence in later interviews. There is a methodological implication here that later gathered data may have some inherent biases towards "official" accounts of happenings than might be the case if the "same" phenomena was observed at the time of its occurrence by early arriving field researchers.

Fourth, the grounded theory approach employed in this study ought to be used more often in disaster studies. This approach is most appropriate where the major objectives are conceptual clarification and the generation of hypotheses, and where qualitative data primarily have to be used. Such objectives and data are necessarily what exist regarding most social and behavioral science questions about disasters.

APPENDIX

Appendix A indicates the dimensions used to address the problem of studying emergent groups in the early staff meetings held by the DRC personnel involved in the project.

Appendix B provides examples of the field guides used in our field work on the project. Since separate field guides were prepared for each field study, it would take too much space to reproduce every field guide we used. However, two examples of guides are presented: the one used in the first (but not the second) field trip we took to the Salt Lake City flood, and the one used in the field trip to the Houston, Texas tornado/flood situation.

Appendix A: Dimensions for discussions in staff meetings

1. Local community focus
Spatial points of attention:
 - EOC (multiple ones situations)
 - on-site command post
 - HQ emergency agencies (disaster, police, fire, Red Cross)
 - Collection points (people-mass shelters; bodies-dead; supplies; information, etc.)
 - Ham/CB radio stations
2. Temporal focus
Emergency time period only:
 - Pre-impact (e.g., preventive actions-levee building; protective actions-specialized evacuations; mitigation measures-resource mobilization; policy setting, etc.)
 - Trans-impact (e.g., damage assessment, search and rescue, handling of mass dead, EMS service delivery, etc.)
 - Post-impact (e.g., missing persons lists, debris clearance, interagency coordination, cleanup and home repairs)
3. Unit of analysis
Group phenomena:
 1. Collectivities of individuals
 2. Representatives of groups
 3. Systems of organizations (public and private)
4. Behavioral focus
New and old:
 1. New: unplanned, non-traditional, very unusual, etc.
 2. Old: need to observe larger context of emergency behavior
5. Data gathering techniques
Reconnaissance and follow-up:
 1. Unstructured interviewing
 2. Participant observing
 3. Document collecting

- | | |
|--------------------------------|--|
| 6. Interview guide: | 1. Informant
2. Respondent |
| 7. Participant observer guide: | 1. Behavior
2. Things |
| 8. Document collecting guide: | 1. Public
2. Private |
| 9. Data processing: | 1. Mechanics
2. Field briefing |
| 10. Data recording: | 1. Field report outline
2. Historical study guide |

Appendix B: Field Guides

FIELD GUIDE #1

Salt Lake City, Utah Flood
1983-0528

This is an area probably not used to flood threats. In addition, the building of a makeshift canal was almost certainly originally unplanned. City and (Salt Lake) county workers and private volunteers were used to build at least two canals, including one two miles long. Thus, it seems probable that there was emergent behavior.

Basically we ought to focus on who was involved and how the organized effort to build the makeshift canals came about.

Organizations to contact

1. Local civil defense or disaster service agency (city/county)
2. Police department
3. Sheriff's department
4. Fire department
5. Local governmental entities directly involved in the flood response (e.g., planning department, mayor's office)
6. Volunteers from private groups (possible Mormon Church involvement)
7. Red Cross chapter
8. Local Weather Service office
9. Local Corps of Engineer office
10. Major media outlets (radio, TV, newspaper most involved)

Interview guide

1. Description of intra and interorganizational response
General question: When did your organization first get involved in the emergency and what did it do until the emergency was over.
Establish intraorganizational activities, interorganizational interactions, and relationship to volunteers.
2. Nature of prior disaster planning
General question: What kind of planning did your organization have for disasters?
Establish state of disaster preparedness for all disasters, but especially floods.
Get picture of prior disaster experiences.
3. Problems in the response
General question: What difficulties or problems did your organization have in responding to this emergency?
Establish what problems were foreseen and those which were unexpected.
Distinguish between intra and interorganizational problems.
Also, were problems of a tangible (personnel, material, etc.) or intangible nature (coordination, control, etc.)?
4. The organized canal building activity
General question: In what way was your organization involved in the canal building activity (or in the language used in the area)?
Establish when activity started; who was involved in initial activities, how work was coordinated, where personnel came from, and what problems

had to be solved.

Should try to get a time frame and a level of effort picture for the whole activity.

5. Lessons learned from the experience

General question: Did your organization learn any lessons for the future from this experience?

Establish what, if anything, would be done different.

See if emphasis is on intra, interorganizational, and/or volunteer activities.

Documents checklist

1. Disaster plans from all groups
2. Organizational logs
3. Minutes of meetings
4. After action reports or critiques
5. Maps of affected and threatened areas

FIELD GUIDE #2

Houston, Texas Tornado/Flood 1983-0520

The area is a very high disaster risk area. DRC has done studies in the area in 1976 (emergency medical services in a chemical disaster), 1978 (base line city in chemical disaster preparedness study), and 1982 (ECGs study).

In this study we want to obtain a picture of the following:

1. Disaster preparedness in the Houston metropolitan area (including Harris County)
2. The organized response to the tornadoes of May 20
3. The organized response to the almost simultaneous flood threat
4. What, if any, actions had to be undertaken on part of emergency organizations which were not planned, traditional, routine, etc.

We do not have to start from zero on this.

The DRC files on 1976-0511 should be looked at since they include a city disaster plan which may or may not be operative now, but still should give some idea of planning at least in past.

The DRC files on 1978 (involves four boxes) ought to be gone through systematically to see what relevant material there is--that study was focused on chemical disaster preparedness so not-an-across the board picture was obtained, but should be some material of relevance.

The DRC files on 1982-0208 the ECGs study of Houston probably does not have too much, but should be at least glanced at; more useful would be to talk to the DRC staff who have been doing work in the Houston area.

We also have recent Houston telephone books available, as well as maps.

In the city the following organizations probably ought to be contacted:

- Police department
- Fire department
- EOC (civil defense)
- Public works department
- Public service department
- Health department
- Mayor's office
- plus Red Cross
- Salvation Army
- Mass communication agencies (most important radio, television, and newspaper)

In the county the following organizations probably ought to be contacted:

- Sheriff's department
- Civil defense and disaster relief office
- Flood control district office
- Health department

The following state and federal agencies probably ought to be contacted:

- State department of public safety (which seems to include among others, civil defense and highway patrol)

Local Corps of Engineers office
Local Weather Service office

Besides operational personnel try to get any official who served as a liaison between two organizations; also try for officials who were at command posts, the EOC.

In this particular situation there are at least four aspects which might suggest that emergent behavior might have developed:

1. The threat and impact were stretched out over time.
2. The threat and impact were diffused, involving a number of different localities in the Houston area.
3. There were two different disaster agents involved: tornadoes and floods.
4. Our previous studies indicate that disaster planning and preparedness in Houston is somewhat uneven and not very systematic.

Interview guide:

1. WE NEED TO HAVE A CHRONOLOGICAL DESCRIPTION OF THE ORGANIZATION'S ACTIVITIES IN BOTH SITUATIONS (tornadoes and floods).
General question: Would you tell me what your organization did in this emergency from the start to the end?
2. WE NEED TO KNOW WHAT SORT OF DISASTER PLANNING AND PREPAREDNESS THE ORGANIZATION HAD (especially for the two disaster agents involved).
General question: What sort of disaster planning did you have for this kind of emergency?
3. WE NEED TO KNOW WHAT PROBLEMS THE ORGANIZATION ENCOUNTERED IN RESPONDING.
General question: What kinds of problems did you have in responding to this emergency?
4. WE NEED TO KNOW IF THERE WAS EMERGENT BEHAVIOR (intra or interorganizational) IN THIS SITUATION.
General question: During the emergency, did your organization have to do anything that had not been planned or was not routine for your group? (Be sure and tap both the intra and interorganizational aspects)
5. WE NEED TO KNOW WHAT THE ORGANIZATION LEARNED FROM THE EXPERIENCE.
General question: If you had to go through this experience again, would there be anything your organization would do in a different way?

(With respect to intraorganizational aspects we are interested if the organization engaged in tasks which it does not normally engage, if members of the organization did things which planning did not call for, if policies and procedures (SOPs) had to be changed in any way, etc.

With respect to interorganizational aspects we are interested if the organization established contact with organizations they do not normally deal with, if they had to coordinate with organizations which were not called for in plans, etc.)

Documents checklist:

1. Disaster plans for all organizations contacted
2. Maps of the affected areas (especially of affected areas and for the two agents)
3. Organizational radio tapes (in an area the size of Houston, many of the emergency organizations should have tapes of their radio communications)
4. Organizational logs

5. After action reports or critiques (by time we get there some should be ready)
6. If an EOC was established, any records available
7. Newspapers from the time period of the emergency
8. Minutes of city council meetings right after the emergency

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