

AGENCIES AND THE LOS ANGELES EARTHQUAKE*

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The relationship between victims and emergency relief organizations has been of consistent interest to students of disasters. Much of this interest has been generated by attempts to increase the effect that organizational warning systems have on individuals under potentially disastrous conditions. Although a number of writers have focused on the match between organizational characteristics and environmental demands, little interest has focused on the attitudinal evaluations that victims make of such organizations (Price, 1967; Adams, 1970; Kennedy, 1970; Ross, 1970; Haas and Drabek, 1973). "This is somewhat surprising, since the most widely studied disaster organizations are either governmental or voluntary and thus heavily dependent upon public support, whether for budgetary allocations or contributions" (Wright, 1975, p. 1). In many cases, attitudinal informa-

tion about emergency relief organizations has been inferred from information as to how potential disaster victims respond to warnings. The implication has been that the nature and timing of warnings during the threat and warning phases are significant predictors of later behavior and emotional response (Cantril, 1940; Killian, 1952; Powell and Rayner, 1952; Janis, 1954; Wolfenstein, 1957; Chapman, 1962; Drabek and Boggs, 1968; Drabek, 1969).

The San Fernando earthquake of 1971 provides a somewhat unique perspective on disasters. First, an earthquake is a natural disaster which, to date, provides no opportunity for warnings to be transmitted to its potential victims [1]. Unlike other studies, the lack of warnings in San Fernando allows us to assume that attitudes expressed about emergency relief organizations are strictly related to victims' post-disaster knowledge of and contact with the organizations and are *not* contaminated by reactions to pre-disaster warnings. Second, unlike many of the disasters studied in the United States, this disaster occurred on the periphery of one of the largest metropolitan areas in the world – an area which contains a highly sophisticated communication system and the California Institute of Technology, one of the major centers for the seismological study of earthquakes.

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This paper will explore the effects of a natural disaster, the 1971 San Fernando earthquake, on the victims' subsequent contact with and attitudes toward emergency relief organizations. The findings will be related in part to theoretical propositions concerning social solidarity in the aftermath of a natural disaster. We suggest that the social environment in which the earthquake took place was a crucial factor in determining: 1) the evaluations Los Angeles residents made of formal agencies; 2) the contact they had with the various agencies; and 3) their awareness of the various agencies.

METHODOLOGY

Description of Sample

The data reported in this paper comes from the Los Angeles Metropolitan Area Survey (LAMAS). Households were interviewed as part of the semi-annual survey conducted by the Survey Research Center at UCLA [2]. The three dependent variables defined in the present paper were obtained from the following questions:

1. Now we'd like to ask about the organizations and agencies that worked on earthquake problems. Do you know of any organizations or agencies that worked on earthquake problems? (Any others?) (Respondent was presented with a card listing eleven organizations.)
2. Did you have any personal contact with any of these organization or agencies?
3. We'd like you to tell us how effective these organizations were. Here is a card with a scale on it. As you can see, 5 represents "very effective", 3 is "somewhat effective", and 1 represents "not effective". You can use any number between 1 and 5. Please give me the number between 1 and 5 which shows how effective you think the organization was.

TABLE I

Respondent's Perception of How Severely He/She was Affected Within Each of the Three Impact Zones

"How badly were you or your family affected by the earthquake?"	Impact Zone			Total N
	High %	Moderate %	Low %	
Very or Somewhat Badly	84.3	19.3	4.5	111
Little or Not At All	15.7	80.7	95.5	667
TOTAL N	70	133	575	778*

*Three persons did not answer the question.

Gamma = .879

$\chi^2 = 327.7, 2 d.f., p < .001$

Definition of Impact Zones

Because data obtained in these surveys represents the entire Los Angeles Metropolitan area, a useful analytic technique was to divide the area into High, Moderate, and Low Impact areas. These divisions reflect both the geographical nature of the earthquake as reported by experts [3] and also the perceptions of severity as reported by our subjects (see Table I).

RELEVANT LITERATURE

The relationship between disaster victims and disaster-related organizations has received considerable attention in previous research (Fritz and Marks, 1954; Form and Nosow, 1958; Moore, 1958; Bates et al., 1963). Our data show that the evaluations of disaster-related organizations by the victims of the 1971 San Fernando Earthquake are much more positive than are comparable responses by victims in previous disaster studies. Yet, in spite of this overall positive pattern, the rank-order of the various organizations remains very similar to that found in past research. In this section we will explore these similarities and differences and will relate them to theoretical conceptions of social solidarity in the aftermath of a disaster.

Previous researchers have found that disaster victims typically evaluate rescue and short-term

relief organizations more positively than they rate formal, professional rehabilitative organizations. The fire department and the armed services, which are active for a short period of time following a disaster, always seem to receive very favorable comments, while the Salvation Army receives nearly as favorable a response. Just as consistently, the American Red Cross receives the worst evaluation (Form and Nosow, 1958, p. 119; Moore, 1958, p. 101; Bates et al., 1963, pp. 51–53; Marks and Fritz, 1954, as cited in Barton, 1963, p. 179).

Many attempts have been made to explain these findings. Most explanations have suggested that the formal bureaucratic procedures followed by the Red Cross clash with the more informal, personally-oriented norms of rural Louisiana or Texas where most of the disaster

studies have taken place (Bates et al., 1963, pp. 45–46; Moore, 1968, pp. 177–178). The Red Cross's policy of awarding financial assistance according to relative need rather than absolute loss is also mentioned as a potential explanation of negative evaluations (Moore, 1958, pp. 179–180; Adams, 1970, p. 395).

Turner has theorized that the hostility toward formal, professional relief agencies such as the Red Cross may be a consequence of the disruption of normal social organization after a disaster and the subsequent process of re-establishment. Turner (1967) suggests that following this disruption the victims need to re-establish basic social bonds based upon shared sentiments before they can re-establish more formal social bonds based upon an interdependence due to the presence of specialized tasks.

TABLE II

Comparison of Ranking of Organizations by Mean Effectiveness Rating as Given by Respondents Who Indicated Awareness of Agencies and Those Who Indicated Contact With Agencies*

Organization	Those Aware of Agency Whether or Not Contact With Agency Occurred				Those Who Established Contact With the Agency Being Rated			
	Rank	Mean Rating	Stand. Dev.	No. of Responses	Rank	Mean Rating**	Stand. Dev.	No. of Responses
Fire Dept.	1	4.8	0.5	178	1	4.9	0.2	17
Radio & Television	tie	4.8	1.0	19	—	—	—	—
Gas Co.	3	4.7	0.6	106	2tie	4.8	0.7	40
Dept. of Water & Power	tie	4.7	0.7	118	4	4.7	0.7	39
Telephone Co.	5	4.6	0.8	87	2tie	4.8	0.6	37
Public Works Dept.	6	4.5	0.8	36	5	4.6	0.7	17
Salvation Army Disaster Service of L.A. County	7	4.4	0.9	69	—	—	—	—
Health Dept.	tie8	4.3	1.0	27	—	—	—	—
Red Cross	8	4.3	0.9	11	—	—	—	—
Civil Defense	10	4.2	1.1	275	6	4.3	1.2	46
	11	4.0	1.2	38	—	—	—	—

*Respondents were asked, "Do you know of any organizations or agencies that worked on earthquake problems (any others)?" Following an affirmative response, the respondent was asked:

We'd like you to tell us how effective these organizations were. Here is a card with a scale on it. As you can see, five represents "very effective", three is "somewhat effective", and one represents "not effective". You can use any number between one and five. Please give me the number between one and five which shows how effective you think the organization was.

Respondent was also asked if he or she had had personal contact with any organizations mentioned.

**Ratings were omitted when less than 7 respondents indicated that they had had contact with an agency.

RESULTS

As Table II demonstrates, the evaluations by the San Fernando Earthquake victims of the effectiveness of disaster organizations are uniformly positive. No organization received a mean rating of less than 4.0 out of a possible high of 5.0. The ratings are presented first for all those who merely indicated an awareness of the particular organization, whether or not they had had contact with it, and secondly, for those who had had contact with the organizations they were rating. The two rankings are very similar and both are positive. In contrast, the standard deviations around the means do show some differences. Among those who had contact with a listed organization, the variability in perceptions of effectiveness is greatest for the Red Cross.

Table III compares the over-all response patterns in the Flint-Beecher Tornado with those of the San Fernando Earthquake [4]. A rating of four or five in our study was considered for this and subsequent comparisons as a positive evaluation; three was considered neutral; and a

rating of one or two was considered negative. The Los Angeles area ratings are much more positive than those recorded in Flint-Beecher. The differences in evaluations between this study and prior ones, may reflect 1) a change in the quantity of organizational assistance received; 2) a change in the quality of organizational assistance received; and/or 3) differences between life styles in a metropolis in 1971 and a rural or small-city area in the 1950's. We would suggest that all three conditions were operative in producing the higher evaluations of disaster organizations in Los Angeles.

I. The Red Cross

As mentioned above, the American Red Cross has been a major source of attention in previous research. When we focus on our data concerning the Red Cross, it is clear that even this much-maligned disaster organization received highly positive evaluations. Table IV compares data on the Red Cross from the present study with data from two previous

TABLE III

Comparison of Evaluative Responses Concerning All Organizations in the 1953 Flint-Beecher, Michigan, Tornado and the 1971 San Fernando Earthquake

Disaster	Evaluative Responses in Percent			Total N of those Responding to Question	
	Positive	Negative	Non-Evaluative	N	Total N of Sample
a. Flint-Beecher Tornado*	31	9	60	Not Given	118
b. San Fernando**					
1) those aware of organization with or without contact	76	6	18	386	781
2) only those with contact with organization	89	3	8	96	781

*Source: Form and Nosow, 1958, p. 119.

**Ratings of five or four were considered as positive; three was considered neutral; and two or one were considered as negative.

TABLE IV

Comparisons of Evaluative Responses Concerning the American Red Cross in Three Disasters: the 1953 Flint-Beecher, Michigan, Tornado; the 1957 Hurricane Audrey in Louisiana; and the 1971 San Fernando Earthquake

Disaster	Number and Type of References				
	Positive	Negative	Non-Evaluative or neutral	Response Total	Total N
a. Flint Beecher Tornado*	34	49	101	184	116
b. Louisiana Hurricane**	28	36	4	68	61
c. San Fernando Earthquake***					
1) those aware of organization with or without contact	209	16	50	275	781
2) only those with contact with organization	33	3	9	45	781

*Source: Form and Nosow, 1958, p. 119.

**Source: Bates et al., 1963, p. 51.

***Ratings of five or four were considered as positive; three was considered neutral; and two or one were considered as negative.

studies. Los Angeles residents expressed positive opinions of the Red Cross. Nonetheless, when compared with other agencies, the Red Cross, relative to other agencies, remains in its familiar position at or near the bottom of the list (see Table II). We would attribute this relatively critical evaluation of the Red Cross to four sources: 1) a general dissatisfaction with relief efforts in Los Angeles; 2) dissatisfaction with the previously mentioned Red Cross policy of awarding assistance on the basis of need rather than loss; 3) dissatisfaction with the degree of coordination of relief activities; and 4) dissatisfaction with the oft-cited bureaucratization and red tape associated with the procedures used by the Red Cross.

II. Respondents' Contact With Agencies

Twelve percent (N = 96) of the total sample had personal contact with one or more agencies. In the High Impact Zone, 78.5 percent had personal contact with one or more agencies. We

hypothesized that contact with agencies would be most strongly predicted by the extent to which the individual respondent was affected by the earthquake. In addition, we assumed that damage suffered would, in large part, correlate with the respondent's proximity to the earthquake. Respondents were asked, "How badly were you and your family affected by the earthquake? Very badly, somewhat badly, a little, or not at all?" Two hundred thirty-three persons responded that they were affected; (see Table I for distribution by impact zone). This group was then asked to describe the ways in which they were affected, i.e., damage to property, personal injury, psychological stress, etc.

Prediction of Contact With Agencies

It was our assumption that agencies would seek out persons who had suffered the greatest amount of damage, or, alternatively, persons who had suffered severe damage would actively seek agency assistance. It seemed logical to as-

sume additionally that severe damage would be correlated with location, but that, given the nature of earthquakes, this relationship would not be absolute. Finally, it was hypothesized that persons from higher social classes might have greater ease in obtaining access to post-disaster services due to their greater knowledge of organizations and their greater ability to manipulate such systems. Janis (1954) gave this idea some support when he suggested that persons of lower social class status and of minority ethnic groups anticipate receiving less aid in the event of a disaster and assume that higher status persons in the community will receive preferential treatment. Janis' observation was supported to some extent by data collected by Bates et al., on the Gulf Coast (1963). Thus, three independent variables were defined: 1) location of respondent's residence; 2) extent

TABLE V

Correlation Matrix for Those Affected of Three Independent Variables, Damage, Location and Income, with Dependent Variable, Agency Contact

	Damage	Location	Income
Contact With Agencies**	0.39*	0.58*	0.19*
Extent of Damage***		0.57*	0.25*
Location****			0.19*

N = 208

* $p < 0.001$

**Contact is coded as follows: 0 = no contact; 1 = contact with one agency; 2 = contact with two, three or four agencies; and 3 = contact with five or more agencies.

***The Index of Damage-Injury was constructed as follows: All respondents who indicated that they were at all affected by the earthquake were asked, "What happened to you?" The responses were coded in detail and broken down into five categories: 1) No damage or injury, N = 63; 2) Slight damage: a few general household items broken or an injury not requiring medical treatment, etc., N = 28; 3) Moderate Damage: chimney, floors, roof or driveway *or* refrigerator broken, etc., N = 63; 4) Moderate-severe damage: driveway cracked *and* refrigerator broken, or china broken *and* stereo set broken, etc., N = 37; and 5) Severe damage: extensive structural damage requiring condemnation or extensive repairs or injury requiring medical attention, N = 34. Very few injuries were reported.

****Location is coded as follows: 1 = Low Impact Zone; 2 = Moderate Impact Zone; and 3 = High Impact Zone.

of physical damage suffered by the respondent; and 3) the respondent's social class as measured by income. Other variables, although sometimes highly correlated with agency contact, were eliminated from consideration either because they appeared to have no intrinsic theoretical importance, or because the relationship they seemingly held with contact was readily eliminated by one or a combination of the other three variables.

Income, damage, and location are all significantly correlated with agency contact (Table V). However, when partial correlations controlling for location were computed, it was found that the correlation between contact and damage fell to 0.10. When multiple regression analysis was used, location was found to be the overwhelmingly significant predictor of agency contact (Table VI), although both income and extent of damage slightly strengthened the prediction [5].

The results substantially destroyed our original hypothesis. Location of the respondent was a far more powerful predictor of contact than was the extent of damage or income. However, when we further examined the relationship for only those who reported some physical injury or damage (170 of 233 who reported that they were affected), it was found that a somewhat curvilinear relationship existed between contact and damage. Persons with slight amounts of damage, as well as those with severe amounts of damage were more likely to report contact with agencies than were persons with moderate amounts of damage (Table VII). Whether the seeming curvilinearity is an artifact or is of relevance is difficult to ascertain. The damage variable was transformed into a linear construct [6], and was then once again entered into a regression analysis. The intention was to test whether the curvilinearity in and of itself was a significant predictor of contact.

Entry of the transformed variable did indeed change the character of the regression (Table VIII). Although location remained the

TABLE VI

Multiple Regression of Contact With Agencies on Location, Income, and Amount of Damage for All Those Reporting Some Effects from the Earthquake

Independent Variables	<i>B</i>	<i>Beta</i>	Standard Error	<i>T</i> -Test of <i>B</i> = 0	<i>F</i>
Location	1.21	0.53	0.16	$p < 0.001$	58.6
Income	0.03	0.08	0.03	N.S.	1.7
Damage	0.10	0.08	0.09	N.S.	1.2
Constant -1.75					

$R = 0.59$ $F = 36.9, 3 \& 204$ *d.f.*, $p < 0.001$

$R^2 = 0.35$

Standard Error = 1.53

$N = 208$

TABLE VII

One Way Analysis of Variance of Agencies With Which Respondent Was in Contact by Amount of Damage for Those Reporting Some Effect From the Earthquake

Extent of Physical Damage Reported	Mean Number of Agencies Contacted	<i>N</i>
None	0.21	63
Slight	1.25	28
Moderate	0.49	63
Moderate-Severe	1.22	37
Severe	3.03	34
Total	1.0	225*

Source	Degrees of Freedom	Sum of Squares	Mean Squares
Between Groups	4	199.4	49.9
Within Groups	220	582.6	2.6
Total	224	782.0	

$\eta^2 = 0.25$, $F = 18.8$, $p < 0.001$

*Eight respondents of the 233 who reported being affected did not specify whether or not they had contact with agencies.

TABLE VIII

Multiple Regression of Contact on Transformed Damage Index, Location and Income for All Those Reporting Some Physical Injury or Damage

Independent Variables	<i>B</i>	<i>Beta</i>	Standard Error <i>Beta</i>	<i>T</i> -Test of <i>B</i> = 0	<i>F</i>
Location	1.23	0.49	0.16	$p < 0.001$	50.9
Income	0.06	0.13	0.03	$p < 0.05$	4.5
Damage	-0.56	-0.42	0.25	$p < 0.05$	4.9
Damage, squared	0.18	0.53	0.07	$p < 0.01$	7.9
Constant -1.54					

$R = 0.61$ $F = 30.6, 4 \& 203$ *d.f.*, $p < 0.001$

$R^2 = 0.38$

Standard Error = 0.82

$N = 208$

TABLE IX

One Way Analysis of Variance of Agencies of Which Respondent Was Aware by Extent of Damage Suffered

Extent of Physical Damage	Mean Number of Agencies	N
None	0.89	63
Slight	1.82	28
Moderate	1.86	63
Moderate-Severe	1.68	37
Severe	2.38	34
TOTAL	1.63	225*

Source	Degrees of Freedom	Sum of Squares	Mean Squares
Between Groups	4	58.2	14.6
Within Groups	220	302.2	1.4
TOTAL	224	360.4	

$\eta^2 = 0.16, F = 10.6, p < 0.001$

*Eight respondents of the 233 who reported being affected did not specify whether or not they were aware of the various agencies.

TABLE X

One Way Analysis of Variance of Average Difference Between Awareness and Contact by Extent of Damage Suffered

Extent of Damage	Average Excess of Awareness over Contact*	N
None	0.95	63
Slight	1.43	28
Moderate	2.17	63
Moderate-severe	1.22	37
Severe	0.82	34
TOTAL	1.38	225**

Source	Degrees of Freedom	Sum of Squares	Mean Squares
Between Groups	4	62.9	15.7
Within Groups	220	558.0	2.5
TOTAL	224	620.9	

$\eta^2 = 0.10, F = 6.2, p < 0.001$

*The number of agencies which the respondent reported having had contact with was subtracted from the number of agencies which the respondent indicated merely being aware of, whether or not contact had been established.

**Fifteen respondents of the 233 who reported being affected did not specify whether or not they were aware of the various agencies.

major predictor, income and damage gained predictive power and the multiple R was slightly increased. In addition, it can be observed that the transformed variable is of some significance in predicting contact. How this shift might be interpreted is open to alternative speculations.

In our opinion, the significant finding is that recipients of post-disaster services are more often determined by a geographic or areal definition of the disaster's impact area than by actual need [7]. We would suggest that the philosophy and policies of the traditional post-disaster services have been formed in large part from the history of services traditionally dispersed. Experience or necessity has gradually caused each agency to define a mission with a correlated set of normal procedures. In some cases, these procedures may have taken on a ritualized or sacred character. To the extent that this has occurred, procedural change becomes increasingly difficult. It is our impression that few of the traditional post-disaster service agencies in the United States have had experience working with earthquake victims. In addition, it is our impression that earthquakes, particularly in large urban areas such as Los Angeles, present different kinds of problems from most other types of disasters. Literally everyone in the Los Angeles basin felt the quake. In addition, while the most severe damage *does* occur within a

certain proximity of the epicenter, scientists have become increasingly aware that soil conditions, the directionality of fault lines and other geological conditions may well determine the extent of ground movement at points quite distant from the epicenter. Thus, areas of severe physical damage as well as area of potential psychological effect cannot be as easily defined in earthquakes as in other types of natural disasters such as tornadoes and floods.

An alternative, although not necessarily antagonistic interpretation is that some potential recipients of available services defined themselves as either not eligible or not in need of services. The fact that family and friends were often reported as significant sources of aid would support this view. In addition, the mass media's focus on the High Impact Area may well have accelerated this type of self-definition.

III. Awareness of, but No Contact with Agencies

Once we observed the potentially curvilinear relationship between damage and contact, it seemed useful to examine the variable of agency awareness apart from agency contact. Far more persons reported awareness of agencies than reported contact with them and the two were highly correlated. However, while agency

TABLE XI

Average Difference Between Awareness and Contact by Impact Zone

Impact Zone	Average Excess of Awareness over Contact	Total N
High	0.98	70
Moderate	2.63	136
Low	0.81	575
TOTAL	1.26	781

Source	Degrees of Freedom	Sum of Squares	Mean Squares
Between Groups	2	323.1	161.6
Within Groups	778	2100.1	2.7
TOTAL	780	2423.3	

$\eta^2 = 0.13$, $F = 59.9$, $p < 0.001$

awareness, like contact, was linearly related with location, awareness, in contrast to contact, has a flatter relationship with the damage reported by the respondent (Table IX).

When a transformed variable is created by subtracting the number of agencies with which the respondent had contact from the number of agencies of which he was aware, the created distribution is a reversal of the curvilinear relationship found in Table VII (see Table X). Interestingly enough, this curvilinear relationship holds for location as well as damage (Table XI).

We suggest that this finding supports our earlier observation that a number of persons who perceived themselves as experiencing moderate amounts of damage, although aware of agencies involved after the earthquake, either did not have access to the agencies, or failed to avail themselves of the services. Although Tables X and XI would lead us to believe that persons experiencing moderate amounts of damage resided in the Moderate Impact Zone, further examination indicated that this was not the case. Persons reporting moderate amounts of damage were *equally divided between the three zones*.

CONCLUSION

We conclude that agency awareness is the product of two factors: 1) contact with the various agencies on the part of potential service recipients; and 2) media coverage. Obviously, if a respondent had contact with an agency, he was aware of it. But additionally, awareness could come about through exposure to the media. Virtually every respondent reported media exposure with radio being the most important immediate source of information and television being the most important overall source. Since we have no detailed information on media exposure, i.e., extent of time spent in reading or listening, or the specific sources to which exposure was made, it is not possible to further explore the types of media or the

extent to which media enhanced agency awareness.

It is interesting to note that a substantial number of persons who reported moderate amounts of physical damage did not report having had contact with any of the agencies. This same group generally indicates awareness of the agencies, but two-thirds of them resided outside the area defined as the High Impact Zone. This combination of findings suggest that persons who are outside a certain perimeter following a disaster are given less assistance by disaster agencies and are not defined by others as "victims", while often experiencing what they themselves consider to be moderate physical and psychological damage. The existence of an active local media and this groups' location within a large metropolitan area may well enhance their awareness of their position *vis-à-vis* those publically defined as victims.

NOTES

- 1 Although warning systems for earthquakes are currently under investigation and a special report was recently issued by the National Academy of Sciences on the potential policy implications of such warnings, the warnings that have been attempted to date have not been particularly successful and their dissemination has been primarily to the scientific community rather than to the general public (National Academy of Sciences, 1975).
- 2 The Los Angeles Metropolitan Area Survey, initiated in the Spring of 1970, is a shared-time omnibus survey of the Los Angeles County public, reported twice a year. Households were surveyed during a two month period immediately following the February earthquake and were asked forty-two specifically developed earthquake-related questions in addition to the previously prepared LAMAS III instrument. In addition, the same items were used in re-interviewing persons from the LAMAS II (Fall, 1970) Sample Frame.

Samples used in LAMAS II and III can be considered representative of Los Angeles County with one exception, the extreme northern (Newhall, Antelope Valley) and western (Malibu, Calabasas, etc.) regions of the County were not included in the frame for these samples. The design of the samples was a multi-stage cluster selection of 30 Census Tracts after stratification by geographic region, median income, and percent black. Respondents within selected households were chosen by means of a random selection table.

The fact that the only persons re-interviewed from the LAMAS II Sample Frame lived in three Census Tracts (1064,

1276, and 3021) means that certain parts of the San Fernando Valley are technically over-represented in this data. These tracts were purposely selected because of their proximity to the earthquake epicenter and to the Van Norman Dam; 94 respondents were part of this re-sampled group.

The response rate for the original fielding of the LAMAS II was 60 percent; the response rate for the earthquake area supplementary selections from the LAMAS II Frame was 81 percent (N = 94); the response rate from LAMAS III was 70 percent (N = 687).

- 3 This division was made with reference to tables of seismographic and accelerographic readings and to damage estimates using the Modified Mercalli Intensity Scale. These tables and maps were provided by Professor C. Martin Duke of the Earthquake Laboratory, UCLA School of Engineering and Applied Science.
- 4 The reader should be cautioned that comparison of organizational ratings across time and data sets is at best suggestive. Because of the diverse methodologies used in the data sets, any effort to apply statistical tests or analysis would be meaningless. However, given the limited data available, it behooves the individual student of disasters to at least attempt comparisons of their data indicators with those of others.
- 5 One can argue the appropriateness of using what may be considered ordinal-level variables in statistical techniques designed for interval-level variables. In addition, the process by which we collapsed and summarized our variables is open to discussion. Given the impreciseness of variable measurement, whether ordinal or interval, in the social sciences, and the lack of multi-variable techniques available for use with ordinal level variables, we do not consider the use of multiple regression as a summary statistical technique inappropriate. It should, however, be remembered that to the extent that the analytical techniques and/or the variable construction is inappropriate, the results should be viewed as suggestive rather than definitive.
- 6 Since the mathematical model employed in regression analysis assumes that each independent variable is linearly related to the dependent variable, it was not possible to directly test the strength of the curvilinear relationship between contact with agencies and damage. Consequently, the variable measuring damage was mathematically transformed into a new variable which could be tested using the regression model (i.e., the value of the damage index assigned to each respondent was squared). This new, second-order variable was then inserted into the regression equation along with the original first-order term. To test for the existence of curvilinearity the following formula is applied:

$$F_{1, N - K - 1} = \frac{(R_b^2 - R_a^2) (N - k - 1)}{(1 - R_b^2)} \times \frac{1}{1}$$

where R_a^2 = the R^2 obtained in the regression equation without the second-order variable (i.e., Table VI).
 R_b^2 = the R^2 obtained in the regression equation which includes the second-order variable (i.e., Table VIII).
 N = the number of cases
 K = the number of variables

In the present example, $F = 9.8$ with 1 and 203 degrees of freedom which is significant at $p < 0.01$. Consequently, it can be argued that a curvilinearity does, to some extent, exist.

- 7 Two alternative, but related explanations exist. One involves the access to Small Business Administration (SBA) loans: the second relates to concerns about property. A second data set gives some insights into the possible relevance of these competing explanations for the reported findings.

A high number of persons took advantage of SBA loans following the San Fernando earthquake. Persons who received money, regardless of location and need, might have high opinions of organizations. Unfortunately the data set used for this paper contains no information on respondents' applications to the SBA. Since the data was collected within two months of the earthquake, date of interview is not readily available, and a large volume of the SBA applications came in later, there is some reason to think that our findings do *not* simply reflect receipt of money.

A second set of data (referred to as the Sylmar data) was collected from 100 families in the high impact zone during the summer of 1971 — six months after the earthquake occurred. Of this group, eighty families had applied for an average of \$3,765 in aid. Seventy-one had received an average of \$3,801; seven were refused aid; and two were still pending at the time of interview. The Federal policy on disaster loans at that time required that only \$500 of the first \$3,000 borrowed must be repaid. As a result of the high rate of applications, primarily during the San Fernando earthquake, the policy was subsequently changed in the Federal Disaster Assistance Act of 1974.

Concern with property and its protection may be crucially related to the respondents evaluations of agencies. The Sylmar data, unlike the LAMAS set reported in this paper, included a great deal of information about evacuation behavior and little information on agencies. Forty-four percent of that sample, which was limited to the high impact zone, did evacuate. Over half of the evacuees periodically returned, against police order, to check on their property.

Evaluations or organizations may, thus, be related to both property concerns and receipt of money. The methodological infeasibility of combining the two data sets does not allow the alternative explanations to be investigated. However, it is our opinion that, regardless of the competing possibilities, location remains a crucial definer of "victim". (Bourque et al., June, 1973)

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