Introduction

This paper is based in part on the results of two surveys conducted in the St. Louis MO-IL Metropolitan Statistical Area and in the Cape Girardeau and Sikeston areas of southeast Missouri, and in part on results of other research reported at a Research Conference on Public and Media Response to Earthquake Forecasts held at Southern Illinois University at Edwardsville on May 16-18, 1991. The surveys and most of the research reported at the conference concerned Iben Browning's psuedoscientific forecast of a possible major earthquake on or about December 3, 1990 on the New Madrid Fault. A major earthquake on this fault would have the potential to cause serious damage and significant numbers of casualties throughout the New Madrid Fault area in southern Illinois, southeast Missouri, northeast Arkansas, and the extreme western parts of Tennessee and Kentucky. Significant damage and casualties could also occur in the Memphis and St. Louis metropolitan areas. Although Browning is not a seismologist and the overwhelming majority of seismologists rejected his method of predicting earthquakes, the forecast, which stated that there was a 50 percent chance of a sizable earthquake within 48 hours of December 3, was widely believed. It appeared to us that the Browning forecast was leading to an unusually widespread pattern of collective behavior, and we felt that it warranted study. As is obvious from the number of papers presented at our research conference, many others felt likewise.

In the first of the two papers we have previously presented (Farley, et al., 1991a), we reported findings from the first of our two telephone surveys, which was conducted on October 14 and 15, 1990. In the second paper (Farley,

et al., 1991b), we reported the results of a follow-up telephone survey conducted in February, 1991, as well as analyses comparing responses from the October survey (hereinafter, Wave 1) and the February survey (hereinafter, Wave 2). Our objective in the Wave 2 survey was to contact and reinterview as many as possible of the 583 households interviewed at Wave 1, wherever possible interviewing the same individual that was interviewed at Wave 1.

In this paper, we summarize the findings presented previously in these two papers, add a summary of papers presented at the Research Conference on Public and Media Response to Earthquake Forecasts, and draw preliminary conclusions regarding what the totality of research thus far reported tells us about the public and media response to the Browning forecast.

Methods

Both the Wave 1 and Wave 2 surveys were joint projects of the Department of Sociology and Social Work and Regional Research and Development Services. The methodology is only briefly summarized here; for detailed discussion the reader is referred to Farley et al. (1991a) for Wave 1 and to Farley et al. (1991b) for Wave 2. The Wave 1 survey, conducted by telephone on October 14 and 15, 1991, utilized a random digit dialing procedure in the St. Louis area and is representative of all households with telephones, including those with unlisted numbers, in the area sampled. Additionally, it included smaller samples drawn from the telephone directories in Cape Girardeau and Sikeston in

southeast Missouri; the latter two communities are immediately adjacent to the New Madrid Fault. The total sample size for Wave 1 was 583, including 415 in the St. Louis area, 87 in Cape Girardeau, and 81 in Sikeston.

The objective in Wave 2 was to contact and reinterview as many as possible of the Wave 1 respondents. Because our main objectives involved correlation and matching of responses between the two surveys, we reported results for the combined samples only (Wave 1 and Wave 2) in our second paper (Farley et al., 1991b). The Wave 2 survey was conducted during an eight-day period from February 17 through February 24, 1991. Most of the respondents were interviewed during the first two days of this period, but in order to reach and re-interview as many as possible of the Wave 1 respondents, a scaled-down callback and interviewing process was continued through February 24. Ultimately, we were successful in reaching 293 of the Wave 1 households, or 50.3 percent of the total. Of this number 202 were in the St. Louis metropolitan area, 42 were in Cape Girardeau, and 49 were in Sikeston. Thus, the percentages of Wave 1 respondents who were reinterviewed at Wave 2 were 48.7 in the St. Louis area, 51.9 in Cape Girardeau, and 60.3 in Sikeston. The relative similarity of these percentages indicates the Wave 1 and Wave 2 samples are geographically comparable,except that Sikeston is slightly overrepresented in Wave 2 relative to its representation in Wave 1.

The overall refusal rate in the Wave 2 survey was 40.4 percent of respondents who were reached. This refusal rate varied from 27.9 percent in Sikeston and 33.3 percent in Cape Girardeau up to 44.0 percent in the St. Louis metropolitan area.

Our objective was, whenever possible, to reinterview the same individual at Wave 2 that we interviewed in Wave 1, while at the same time maximizing the number of households reinterviewed at Wave 2. If that person was known and available, he or she was interviewed. If not, we conducted the interview with the person who answered the telephone, so long as that person was at least 18 years old. This was done in order to maximize the number of households responding and avoid unnecessary and potentially unanswered callbacks.

Of the 293 households we reinterviewed at Wave 2, we were able - to the best of the respondent's memory - to reinterview the same individual we had interviewed in Wave 1 in 203 cases. This represents 69.3 percent of all Wave 2 interviews, and 34.8 percent of the individuals we had interviewed in Wave 1. These percentages did not vary greatly among the St. Louis area, Cape Girardeau, and Sikeston subsamples. Comparisons revealed that the Wave 1 and Wave 2 samples were very similar with respect to race, gender, and whether or not they have children. There is also general similarity with respect to age, marital status, and income. There was also no evidence of self-selection bias in Wave 2 with respect to interest or concern about earthquakes. Based on all this evidence, we concluded that both the overall Wave 2 sample and the Wave 2 subsample of same individuals who were interviewed in Wave 1 were in all regards that we can measure quite representative of the full Wave 1 sample.

Background and Summary of Findings:

What We Know, Think, and Don't Know From Our Two Surveys and the Literature

Our basic theoretical framework in both of our papers was to treat the Browning episode as an example of collective behavior occurring within a dispersed collectivity (Turner and Killian, 1987, pp. 71-74). When fears concerning some perceived threat spread rapidly within a dispersed collectivity, the phenomenon is often referred to as mass hysteria, though it should be stressed that this phenomenon need not (and usually does not) involve a majority or even a large minority of the population (Rosengren et al., 1975; Miller, Mietus, and Mathers, 1978). What it does involve, however, is a spread of concern about some perceived threat among a sizable number of people who are geographically dispersed from one another rather than concentrated in a crowd. The particular type of behavior under study in this case has sometimes been referred to as psuedo-disaster, that is, the rapid spread of the belief that a disaster is either under way or about to occur (Rose, 1982: 24-26).

In our first paper (Farley et al., 1991a), we argued, following a variety of writers on collective behavior (Turner and Killian, 1987, p. 53; Allport and Postman, 1947; Shibutani, 1966; Ball-Rokeach, 1973), that incidents of collective behavior such as the Browning earthquake scare frequently happen in situations of uncertainty and ambiguity. We argued further that, with respect to earthquakes, the situation in the Midwest was particularly ambiguous due to (1) the lack of experience with earthquakes in this region (2) the recency with which earthquake risk had been widely and

publicly identified as a concern in the Midwest and (3) the new attention drawn to this risk by the 1989 Loma Prieta quake in the San Francisco area. Added to this were the fact that it was not clear what Browning's credentials were, nor was it entirely clear in the public mind whether he had or had not successfully predicted earlier earthquakes, including the Loma Prieta quake.

At that time, we also argued that the public's perceptions of science and of the response of scientists to the Browning forecast may have played an important role in how people responded to the forecast. We shall elaborate on this point shortly, but first shall briefly summarize what we expected to find and what we did find in the first survey, and what questions these expectations and findings raise for the present paper.

What we Learned From Wave 1

Here we briefly summarize what we expected to find and what we found in our analysis of Wave 1. Detailed discussion of the results, methods, and underlying theories of the Wave 1 analysis can be found in Farley et al. (1991a). We expected, following Turner, Nigg, and Paz's (1986) notion of the two-step flow of communication, that while the media served as people's initial source of information about earthquake risk, interaction with significant others would play a key role in formulating people's response to that information, i.e. whether or not they believed the forecast and what they planned to do about it. We found this to be the case - but mainly and most particularly for the planned behavioral response. In other words, the response of significant others appeared to play its most prominent role in

shaping what people planned to do about the forecast in terms of altering their schedule. In fact, the perceived response of significant others was by far the most powerful predictor of this response. In many regards this is consistent with past research findings (Mikami and Ikeda, 1985; Kerckhoff, Back, and Miller, 1965; Couch, 1970; Baker, 1979), but a possible new twist is the notion that people may use the media for information and decide whether or not to <u>believe</u> the forecast largely on the basis of that information, but when they decide what to <u>do</u> about it, they appear to turn much more to their family, friends, and neighbors (Farley et al., 1991, p. 34). Such an interpretation is also highly consistent with findings of Turner, Nigg, and Paz (1987, p. 223) regarding preparedness for earthquakes in the Los Angeles area, and with Mileti, Fitzpatrick, and Farhar's (1990) findings on public response to the Parkfield earthquake prediction in California.

Also important was the response of institutions - the schools and the workplace. While these institutions potentially influenced responses on a social psychological level - i.e. by validating people's concerns when they altered their schedule, they also operated in a much more direct way by forcing people to adapt to their schedule changes. Thus, we found, as expected, that when these institutions changed their schedules, people also planned schedule changes. We also expected and found that women as compared to men, younger people as compared to older people, and people of relatively lower educational levels would be more likely to believe the forecast. On the other hand, these characteristics did not affect people's plans to change their schedules, net of the responses of significant others and institutions.

We also found that certain other factors influenced people's belief in the forecast. A minor earthquake (Richter 4.6) that occurred on the New Madrid Fault on September 26, 1990 influenced the thinking of many concerning the likelihood of a major December quake, and most whose thinking was influenced were influenced in the direction of thinking that a major quake in December was more likely, not less likely. This is consistent with findings of Turner, Nigg, and Paz (1986) regarding the effects of a similar minor earthquake during a period of earthquake concern in Los Angeles. Also consistent with the literature (Rose, 1982, pp. 28-29; Cantril, 1965; Mazon, 1984, pp. 16-19, 30; Beer, 1981, pp. 56-57) is the notion that fears and concerns about the possibility of war with Iraq may have contributed to the spread of concern about the Browning forecast, and we did indeed find that people who thought a war with Iraq likely also were more likely than others to consider a December earthquake likely. On another level, this may have reflected generalized worry or fear; in other words, the notion that people who worry about one threat are also more likely to worry about another (Lazarus, 1966).

Two Key Behavioral Issues: Schedule Changes and Preparedness

Two other important findings emerged from the first survey that also have some important implications for this paper. First, we found that there was only a weak link between the <u>cognitive</u> dimension - i.e. believing the Browning forecast, and the <u>intended behavioral</u> dimension - i.e. planning schedule changes. In fact, what relationship there was almost entirely disappeared after controls for the responses of significant others and of

schools and employers. Of course, the intended behavioral dimension does not necessarily translate into actual behavior. People often can and do behave differently than they say that they intend to or would, as was first illustrated by La Piere's (1934) classic study. For this reason, we were very interested in finding out three things in Wave 2: (1) What proportion of those who said that they planned to change their schedule actually did? (2) What was the relationship between people saying that they planned to change their schedules (in Wave 1) and actually changing them (as self-reported in Wave 2)? (3) Was there any relationship between believing the forecast (again, as reported in Wave 1) and actually changing one's schedule (as reported in Wave 2)?

The second important finding, also relating to behavior, was that a variety of indicators showed that Browning's forecast had led to an increase in earthquake preparedness. However, there was no certainty that this level of preparedness would be maintained after a disconfirmed earthquake forecast. Turner, Nigg and Paz's (1986) research, for example, showed that interest in earthquakes tends to rise and fall over time, and at least as measured by frequency of media mention of earthquake risk, it would appear to have fallen sharply in the New Madrid seismic zone since December 3. In contrast to our findings, Turner, Nigg, and Paz also found that for the most part public interest did not translate into actual personal preparedness, although normative support for preparedness did rise as a result of a serious of events interpreted as indicating that a significant earthquake could be about to occur in Los Angeles in the mid-1970s. Preparedness then remained fairly stable over a period of more than two years. For these reasons, it is

difficult to say with certainty what the longer term consequences of the Browning forecast might be with respect to preparedness, although as noted there is some reason to expect that it might fall off after a disconfirmed forecast. Despite this uncertainty, we were very interested in assessing the public's level of preparedness in February, slightly more than two months after the date for which the earthquake was predicted but did not occur. Of course, whatever trend we find for the October-February period, there is no certainty that this trend will be sustained over the longer run.

Key Questions for Wave 2

In our Wave 2 (February) survey, we were interested in answering the following overarching questions:

1. Of those who indicated that they planned schedule changes at the time of the Wave 1 interview, how many actually did change their schedules?

2. What were the relationships between believing the forecast before December 3 and the actual behavioral response to that forecast? Also, what was the relationship between believing the forecast beforehand and retrospective self-reports of concern about an earthquake on December 3?

3. How did the views of the respondents toward science, including their perceptions of scientists' responses to the Browning forecast, influence their response to the forecast?

4. In what ways did the disconfirmation of the Browning forecast influence respondents' beliefs about the long-term likelihood of a damaging earthquake on the New Madrid Fault?

5. What was the level of preparedness two months after the predicted date of the earthquake, and what effects, if any, did the entire episode have on earthquake preparedness in the New Madrid seismic zone?

6. What were the effects of various sociodemographic factors on perceptions concerning scientists, beliefs about earthquake risk, and behavioral response to the Browning forecast?

Perceptions of Science and Responses to the Browning Forecast

As indicated in Item 3 above, we believed that how people perceive science and the response of scientists to the Browning forecast may be an important factor influencing how they responded to the forecast. There are two related, though distinct, issues at work here. One centers around general attitudes toward science, particularly along a dimension of trust as opposed to skepticism. The other has to do with the public's perceptions about the response of the scientific community to the Browning forecast. We shall address the former first.

Generalized Attitudes Toward Science. In Wave 1, we made some effort to address the trust/skepticism issue by asking whether respondents thought "scientists who study earthquakes" were a good, fair, or poor information source about earthquakes. Most responded "good." We also found that the more positively scientists were viewed in this regard, the more likely people were to believe the Browning forecast (Farley et al., 1991, p. 38). In one sense, this is curious, since the vast majority of seismologists were highly critical of the Browning forecast. Yet, viewed in other ways, it makes a certain amount of sense, although it can clearly be interpreted in more than one way. We also asked people to rate government and business as good, fair, or poor sources of information about earthquakes. Not surprisingly, these sources of information received lower ratings than scientists. Yet, one thing remained the same: the more positive people were in their ratings, the more likely they were to believe the Browning forecast. This was truer in the case of business than government, but there is some evidence of the pattern in both cases. To

put it a little differently, whether we asked our respondents about scientists, government, or business, what we found was that the more positively they rated them as sources of information, the more likely they were to expect a December earthquake.

One interpretation of this pattern could be that some people accept what they are told, while other people are more skeptical. A consistent pattern of rating sources of information highly, along with believing the Browning forecast, would be certainly fit well with such an interpretation. And in our earlier paper, citing Kohn's (1969) work on class and conformity, we offered such a pattern of acceptance as a possible explanation of the tendency of less educated people to show greater belief in the Browning forecast, which they did.

Other possible interpretations exist, however, and these led us to explore this issue further in the follow-up study (Wave 2). For one thing, Turner, Nigg, and Paz's (1986) research on response to earthquake risk raised some interesting findings with respect to people's views of science. One finding, certainly consistent with our Wave 1 findings, was that people did not view science and psuedoscience in a mutually exclusive manner. Rather, they drew upon both and to some extent believed both, even when their messages were contradictory. Turner, Nigg, and Paz wrote (p. 273), "Our principal conclusion is that coexistence rather than polarization is the rule as far as science and nonscience and naturalistic and nonnaturalistic frames of reference are concerned." Accompanying this finding, and perhaps related to it, was a finding that people tended to believe that science could do things

that in fact it cannot do. Rather surprisingly, 84 percent of Turner, Nigg, and Paz's respondents said they believe that science can or soon will be able to predict earthquakes, and 42 percent said that science already can predict quakes at least "somewhat accurately." Again quoting Turner, Nigg, and Paz (p. 255), "Compared with scientists' claims, these findings indicate widespread overconfidence in current scientific capabilities (faith in science may include elements of magical belief!)." In fact, there has been no case as yet in which science has predicted the time and place of a major earthquake, although it has become more successful at identifying places that are at increased risk of earthquake, without predicting the specific time, date, or even year in which a damaging quake will occur.

Turner, Nigg, and Paz suggest, and we agree, that this may offer some of the explanation of the appeal of psuedoscientific forecasts like that of Browning and of Henry Minturn in Los Angeles in 1976 (a forecast strikingly similar to Brownings, which triggered a very similar, though less widespread, chain of events - see Turner, Nigg, and Paz for further discussion). Turner, Nigg, and Paz's (1986, p. 113) research indicated clearly that what people wanted most from scientists as they waited for an earthquake in southern California was <u>precise</u> information. Moreover, people believed that science could offer such precision, often to a greater extent than it could. This brings us to the one common criticism of science that Turner, Nigg, and Paz's research uncovered: people believed, especially in the earlier parts of a period of heightened earthquake concern, that scientists were telling the public less than they really knew. Given that they distrusted scientists in this one respect, along with their false sense of the precision that science

could offer, people were highly susceptible to a psuedoscientific earthquake forecaster such as Henry Minturn, who offered them a precise day on which to look for an earthquake (December 20, 1976). Obviously, Browning's forecast for December 3, 1990 offered the same thing, and offered it to people who were probably even less familiar with and more confused about earthquake risk than southern Californians in 1976.

Discussions among our research team raised another issue relating to science. We did, as noted above, find that acceptance of scientists as a good source of information about earthquakes was positively correlated to believing the Browning forecast, and in one regard this seemed to fit the view that those with general tendencies toward uncritical acceptance of information were more likely to believe the Browning forecast. Considering this along with the above-mentioned research by Kohn on class and conformity, we could argue that those with less education and lower socioeconomic status are socialized to be less questioning, and so are uncritical of both scientists and psuedoscientists (as well as, our findings suggest, of government and business). Thus, we could explain several of our findings on this basis. The same principle could be extended to gender as well, based on Rose's (1982) argument that gender differences in response to threat and psuedo-disaster may be linked to a socially-inculcated role of passivity in women. Rose argued that women are for this reason less likely to be active skeptics and critics of those who say that there is a threat. Our Wave 1 data are in important regards consistent with these arguments, but discussions among our research team nonetheless made us skeptical about accepting such an interpretation too quickly.

To begin with, there is good reason to believe that such uncritical acceptance is becoming less common, particularly among women. Rose (1982) posited that, to the extent that feminist values spread (as they indeed have), such uncritical acceptance will become less common among women. In addition, science as an enterprise has been largely the cultural domain of middle and upper class males, so that one would expect a greater cultural affinity of these groups with scientists. Notable in this respect is the educational channeling of middle and upper class white males toward science and mathematics, and of other class, race, and gender groups away from it (Safran, 1988; Stacy, Bereaud, and Daniels, 1974; Alexander, Entwisle, and Thompson, 1987). For these reasons, an outsider such as Browning who challenges the scientific establishment could have a considerable appeal to such groups, particularly if their cultural distance from science is heightened by a perception that scientists are "holding back" information. Thus, distrust of and cultural distance from science, not uncritical acceptance of it, could underlie some of the gender and class relationships with belief in Browning's forecast.

For this reason, we obtained additional information in Wave 2 concerning people's general perceptions of scientists. Respondents were invited to agree or disagree with the statement that "I generally trust what scientists tell me about things I'm not familiar with." The intent of this statement was to get a more direct and more global measure of trust/skepticism toward science than was elicited by the measure in Wave 1, which specifically related to earthquakes and did not directly assess the question of trust. The responses

to this statement were correlated with sociodemographic variables as a means of assessing the competing interpretations discussed above regarding science and class, race, and gender. The were also correlated to both Wave 1 and Wave 2 measures of response to the Browning forecast.

The Response of Science to the Browning Forecast. The other important variable involving science was the question of how the public perceived the response of the scientific community to the Browning forecast. This could be quite important, because it could influence how Browning himself was perceived. Objectively, the vast majority of earthquake scientists who had anything to say about the Browning forecast took the position that it was not scientifically founded. However, this view was not unanimous. At least one widely-known Midwest earthquake expert, David Stewart, at the time director of the Center for Earthquake Studies at Southeast Missouri State University and of Missouri's earthquake preparedness agency, made public statements that the forecast was plausible and should not be rejected out of hand. Both media speculation and personal communications from other social researchers have led us to believe that Stewart's statements may have contributed to a perception in the general public that earthquake scientists disagreed among themselves on the validity of the Browning forecast. If this was the case, it could have had the effect of creating the impression among the public that it was a matter of general scientific controversy as to whether or not a strong earthquake would occur on or about December 3, 1990. In turn, if this impression was widespread, Browning could well have been perceived as a scientist on one side of an unresolved scientific dispute. This may have greatly increased his credibility.

To assess these possibilities, two items were included in Wave 2. One item assessed the public's perceptions of how scientists responded to the Browning forecast, i.e. whether they generally agreed that a December quake was likely, disagreed among themselves, or generally agreed that a December quake was unlikely. The other item was designed to determine whether or not Browning was perceived as a scientist. Both items were correlated to sociodemographics and to responses to the Browning forecast, using measures from both Wave 1 and Wave 2.

Findings From Wave 2

Schedule Changes. We found that the number of people who reported that they actually made schedule changes - in the specific forms of keeping children home from school, staying home from work, or leaving the area - was considerably smaller than the proportion who had indicated in the earlier survey that they planned schedule changes. Moreover, the majority of the changes that did occur appear to have been in response to school closures, which were the rule in the Cape Girardeau and Sikeston areas (about 24 percent of our Wave 2 respondents reported that their children's schools had been closed.). Nonetheless, those who had told us in Wave 1 that they planned to make schedule changes or that they thought a December 3 earthquake was likely were more likely than others to report having actually changed their schedules. About 7 percent of those surveyed made some schedule change, and 1 percent reported that they had left the area because they were concerned about the possibility of an earthquake. It is possible, of course, that some of the

discrepancy between Wave 1 plans and Wave 2 self-reported behavior may be accounted for by efforts at dissonance reduction (since no earthquake occurred), but we believe that most of the difference is real.

We found that people with children were more likely to stay home from work than people without, and women were more likely to stay home from work than men. Both of these findings may be attributable to people staying home to take care of children whose school was not in session; past research has shown, for example, that in two-worker families, it continues most often to be the wife/mother who has to miss work for reasons of child care (see Coverman and Shelly, 1986; Hochschild, 1989). Education shows a noticeable though weak and statistically non-significant relationship with both keeping children home from school and staying home from work; those with high levels of education were less likely to do either.

Perceptions of Science. As was explained in an earlier part of the paper, we felt it would be instructive to further explore how peoples' view of science and scientists influenced their response to the Browning forecast. We asked Wave 2 respondents to "strongly agree," "agree," "disagree," or "strongly disagree" with the statement that "I generally trust what scientists tell me about things I'm not familiar with." Beginning with the sociodemographic correlates of this variable, we found statistically significant relationships to age and education: People over 65 are less inclined to trust scientists than are people under 65, and the tendency to trust scientists also increases with educational level. The latter finding supports the "closeness to scientific culture" argument that more educated

people may be more accepting of science than the less educated, and goes against the notion of uncritical acceptance of scientific authority by the less educated, which we had postulated in our first paper based on the Wave 1 findings. In short, it suggests that the appeal of a maverick challenging the scientific establishment may have had something to do with the higher levels of belief in the Browning forecast by those with lower education. On the other hand, however, there was also no relationship between trusting scientists and either having expected a December earthquake in Wave 1 or reporting having been concerned about such an earthquake in Wave 2. Thus, we are left with the conclusion that, at least as measured by this indicator, generalized perceptions of scientists did not have much to do with how people responded to the Browning forecast.

Perceived Response of Scientists to the Browning Forecast. The other key variable relating to science and scientists was the respondents' perceptions about how scientists responded to the Browning forecast: did they generally agree with it, disagree among themselves about it, or generally agree that it was incorrect? Respondents were quite evenly divided on this point: About half thought that scientists had been in agreement that a December quake was unlikely, but almost that many, 41 percent, thought that scientists had disagreed among themselves about the prediction. This suggests that any lack of unanimity on the part of scientists concerning a highly visible scientific question will be perceived by many people as showing scientific disagreement. However, there was almost no relationship between perception of scientists response to the Browning forecast and people's own Wave 1 judgments about the likelihood of a December quake: Matching of Wave 1 and Wave 2 data showed that

those who thought that scientists generally rejected the forecast were only slightly less likely than others to have given Wave 1 responses indicating that they thought a December 3 quake was likely. At most, any effect that perceptions of the scientific community's response to the forecast had on people's belief in the forecast was clearly small. Nonetheless, population groups who disproportionately perceived scientists as either supporting the Browning forecast or disagreeing among themselves were in certain cases the same groups that were more likely to believe the forecast: women, and persons with less than 4 years of college are examples of this.

Quake concern, Likelihood, and Consequences. In our Wave 2 questionnaire, we also asked respondent how concerned they had been about a possible earthquake, and included items asking respondents to assess possible consequences of a major earthquake in their own neighborhoods. We found that those who thought an earthquake was most likely also anticipated the most damage and the largest number of casualties. Not surprisingly, quake likelihood and anticipated quake consequences were both associated with quake concern.

One final note regarding the Wave 2 "concern" variable - we found that, with some minor differences, it related to sociodemographics in a manner very similar to what we found in Wave 1 for beliefs about the likelihood of a major December quake. As shown in Table 20, retrospective self-reported concern about a December quake declined with age and (to a considerably lesser extent) education, was higher among people with children than without, and was higher

among women than among men. Race, on the other, showed no significant relationship to this variable. In general, quake concern related to sociodemographics in a manner similar to quake likelihood.

Preparedness. We asked respondents about the same four preparedness indicators as we asked about in Wave 1: securing objects that could fall during a quake, storing food and water, knowing how to shut off utilities, and having earthquake insurance. The proportion who had done all four of these things was higher in February than it was in October. This suggests very strongly that the increase in preparedness we noted in Wave 1 continued following October. Moreover, it is encouraging that this high level of preparedness was sustained more than two months after the Browning forecast had been disconfirmed.

Findings Reported in Conference Papers

We now extend our discussion to address findings reported by other researchers at the May research conference. We shall address beliefs regarding likelihood of an earthquake on December 3, plans to make schedule changes on December 3, perceptions regarding long-term likelihood of an earthquake in the New Madrid Seismic Zone, and effects of the Browning forecast on preparedness. This discussion will be based on the population surveys summarized in Table 1. Additionally, we shall briefly discuss two content analyses of media coverage of the Browning forecast that were reported at the conference, and two reports of the effects of the forecast on disaster preparedness agencies in the New Madrid Seismic Zone.

As can be clearly seen in Table 1, the population surveys were conducted in a wide variety of areas throughout the New Madrid Seismic Zone and involved a wide array of issues. Some were mainly aimed at describing public opinion, others were designed to test very specific theories or hypotheses, and yet others fell somewhere between. In the following section, we shall focus on certain key issues that tended to recur among the surveys and attempt to summarize and synthesize what the surveys taken as a whole indicate.

December Quake Likelihood

Six of the surveys directly asked respondents how likely they thought an early December earthquake was, or how believable the found the Browning forecast (see Table 2 for a summary). Unfortunately no two of the studies used identical wording, and the items used to elicit responses on this issue varied widely. They differed with respect to the number of choices offered and whether or not a "neutral" (i.e. 50-50 chance or as likely as not) choice was offered. (Of course, it could be clearly argued that even agreement with such a "neutral" choice could be taken as support of Browning, since his "projection" was that there was a 50-50 chance of a major earthquake on the New Madrid fault around December 3. In the two surveys that clearly offered a middle choice (Wetzel et al., 1991; Kennedy, 1991) it was the modal choice, being chosen by 46 and 47 percent of respondents respectively. In most of the other studies, there was a tendency to pick the ambiguous choices, with relatively few being very sure that there either would or would not be an earthquake. The studies varied in the relative proportions of respondents who

chose responses closer to the "likely" or "unlikely" end of the scale. In the Farley et al. (1991) and Wetzel et al. (1991) studies there were more who chose answers toward the "likely" end of the scale, although in a separate item where respondents were asked to guess whether it was more likely that the forecast would "come true" or "not come true," the latter was chosen by a margin of 4 to 1 in the Wetzel et al. study. In the Kennedy (1991), Edwards (1991) and Sylvester (1991) studies, more people chose responses on the "not likely" side of the scale than on the "likely" side. Insufficient information was given in the Atwood (1991) study to determine this, though Atwood's statistics suggest a majority may have leaned toward the "likely" end of the scale. Clearly, the wording, survey methodology, and possibly the location and timing of the surveys had effects on responses. Yet, equally clearly, the population was divided on the likelihood of the Browning forecast everywhere, and the majority probably did not either firmly accept it or firmly reject it.

Two studies, Farley et al. (1991a) and Sylvester (1991) found effects of gender and education. Both studies found that women were more likely to report believing the Browning forecast than were men, and that educational level was negatively related to believing the forecast. Farley et al. found people with four years of college less inclined than other to think the predicted quake likely, and Sylvester found that people with less than 4 years of high school were more likely than others to believe it. Two studies also found effects of nearness to the New Madrid Fault on perceived quake likelihood. Kennedy (1991) found that people in southern Indiana were slightly more likely than those in the central or northern part of the state to consider an early December quake likely, and much more likely to think it

would cause significant damage in their communities. Farley et al. (1991a) found higher perceived likelihood of an December 3 earthquake in Cape Girardeau and Sikeston as opposed to the St. Louis area; the former cities are much closer to the fault than St. Louis.

It also appears that the perceived likelihood of a damaging quake in December did not increase as the predicted date approached. The time series data collected by Kennedy (1991) in Indiana indicate this, as does comparison of Farley et al.'s findings from their October survey in the St. Louis area with Sylvester's (1991) findings from her November survey in the same area. While these two studies used quite different measures, the fact that Sylvester's data appear to indicate lower levels of belief in the forecast suggest at the least that belief in the forecast was not higher at the time of her survey than at the time of Farley et al.'s earlier survey. A possible explanation for this is that efforts by scientists to discredit the Browning forecast intensified as the predicted date approached, and these may have helped to curtail any further spread in belief in the forecast.

Various studies also correlated other factors to believing an early December quake to be likely. Atwood (1991) found that those who thought a quake was unlikely and saw the forecast as relatively unimportant personally were more likely to show the "third person" effect, i.e. to perceive others as more influenced by the media than themselves. Farley et al. (1991a) found that people who thought a war with Iraq likely and persons whose thinking was influenced by the minor earthquake on September 26 were more likely to believe the forecast.