



## **CLARIFYING THE LIFE RECONSTRUCTION PROCESSES OF VICTIMS OF THE 1995 HANSHIN-AWAJI EARTHQUAKE ON THE PSYCHOLOGICAL TIMELINE**

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### **SUMMARY**

In this study, we have clarified the life reconstruction processes of disaster victims from the viewpoint of psychological time. The questionnaire items have been superimposed on social statistics data that substantiate the feelings and behavior of disaster victims to measure psychological time. Through the analysis of the data from the social random surveys, the patterns of victims' behaviors are found, which were changed at the points of 10, 100, and 1000 hours after the event occurred. 50% of the victims were sure that "I was prepared to have an uncomfortable life for quite some time" and "I understood the entirety of the damage" 10 hours after the event. 50% of the victims were sure that "I felt it was safe," "Office/school has resumed", and "We have completely dealt with housing issues" 100 hours after. 50% of the victims thought, "I no longer feel that I am a victim of the disaster" after 1000 hours.

### **INTRODUCTION**

#### **Clarification of Life Reconstruction Processes**

The 1995 Hanshin-Awaji Earthquake was a gigantic urban disaster that not only caused physical damage to cities' development, but also had significant psychological and social impacts upon the bodies, minds, and lives of disaster victims, local community relationships, organizations, groups, and social systems. The experience of the earthquake has made it clear that reconstruction following such damage is comprised of three elements: urban reconstruction, economic reconstruction, and life reconstruction.<sup>1)</sup>

In particular, life reconstruction by disaster victims had rarely been studied in Japan prior to the Hanshin-Awaji Earthquake. Clarification of life reconstruction processes will facilitate the fashioning of disaster management plans and the preparation of basic materials for enhancing people's awareness of disaster prevention and preparedness for disaster

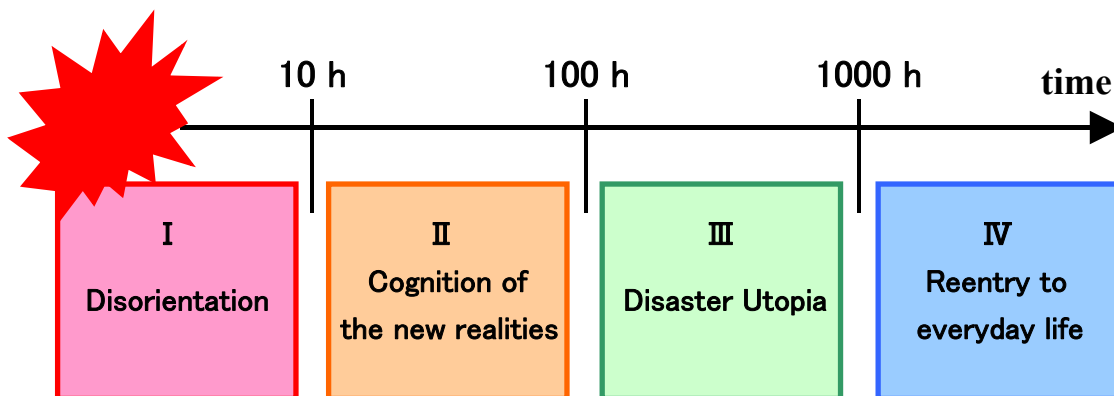


Figure 1: Four Time Phases after the Earthquake

prevention. These plans and materials will significantly contribute to a decrease in social vulnerability, which is the objective of disaster reduction. Therefore, clarification of the life reconstruction process is an important area of study in disaster prevention.

#### Four time phases following the occurrence of the disaster

We have been studying the life reconstruction processes of victims of the Hanshin-Awaji Earthquake, and, in particular, how the disaster victims established new daily lives in the post-disaster environment. We conducted random mail surveys of the Hanshin-Awaji Earthquake disaster area in 1999, 2001, and 2003.<sup>2)-4)</sup> In these surveys, we verified the hypothesis that the feelings and behaviors of disaster victims change during four periods of time that are separated by three time axes: the day of the disaster (10 hours), two to four days (100 hours) after the disaster, and two months (1,000 hours) after the disaster.

The four time phases are: **I. Disorientation phase:** a period in which the victims suffer from severe stress due to the impact of the disaster, and have difficulty objectively understanding what is happening around them, **II. Cognition of new realities phase:** a period in which the victims rationally accept the damage caused by the disaster and understand that a new reality of a disaster-stricken society has begun, **III. Disaster Utopia Phase:** a period in which a primitive communal life is formed based on values different from those of ordinary times due to the paralysis of conventional social functions, **IV. Reentry to Everyday Life phase:** a period in which social flow systems are restored and people begin to reconstruct their lives (Fig. 1).

#### Psychological time-lines of disaster victims

We set time bases of 10 hours, 100 hours, and 1,000 hours, which are the powers of 10 based on the theory of psychology known as Weber-Fechner's Law. This law states that the human sense is governed by the law of logarithm, and that the magnitude of the human psychological sense is proportional to the logarithmic scale of the magnitude of the

physical stimulus.<sup>5)</sup>

A disaster causes abrupt and significant changes to people's living environments and presents an enormous stimulus that is incomparable in magnitude to that of ordinary life. When the magnitude of the stimulus or disaster experience changes arithmetically, the victim's response based on the psychological time sense of disaster victims changes logarithmically. Very few, if any, objective scales for psychological time exist; thus psychological time is rarely reflected in social systems. However, as human beings behave on the basis of psychological time, the psychological time of victims following a disaster cannot be neglected. To undertake measures in line with the behavior of disaster victims, it is essential to clarify the behavior patterns of disaster victims based on psychological time.

### **Objective of our research**

In this study, we have clarified the life reconstruction processes of disaster victims from the viewpoint of psychological time. The questionnaire items have been superimposed on social statistics data that substantiate the feelings and behavior of disaster victims to measure psychological time.

## **METHOD**

### **Outline of survey**

The data reported herein was obtained from random mail surveys that were conducted in 1999, 2001, and 2003 to learn about the life reconstruction processes of disaster victims in the Hanshin-Awaji Earthquake disaster area. The subjects of the surveys and the survey methods are shown in Table 1.

### **Items examined in this study**

From among the questions asked in social surveys, we selected the following five: 1) Damage to the house, 2) Duration of repair or demolition of the house, 3) Length of time until the place of work resumed operation, the disaster victim left or changed jobs, or changed or closed their business, 4) Utilities and infrastructures' (electricity, telephone system, sewage line, water line, transportation system, gas) restoration period, and 5) Reconstruction calendar. From among the social statistics data that substantiated disaster victims' feelings and behavior, we selected three items: 1) Rate of identification of bodies, 2) Rate at which shelters were dissolved, and 3) Strength of ground motion.

The reconstruction calendar features the following brief introduction: "Very little information exists regarding how people in disaster-stricken areas restore and reconstruct their lives. Would you please try to recall how your feelings and behavior changed as time passed after the disaster. Please mark the number of the period on the calendar that you think applies." Following this introduction, six items, which are milestones in the life

Table 1: Survey Overview

	1999 survey	2001 survey	2003 survey
Surveyed Points	250 points (JMA 7 and/or City Gas Stopped)	The Same 250 points plus 80 additional points within Kobe	The Same 330 points
Subjects	Head of Household over the age of 20	Men & Woman over the age of 20	Men & Woman over the age of 20
Sampling Method	2-step Stratified Random Sampling Method	2-step Stratified Random Sampling Method	2-step Stratified Random Sampling Method
No. of Questionnaires Sent Returned(%)	2,500sent & 683 returned (27.3%)	3,300 sent & 1389 returned (42.1%)	3,300 sent & 1356 returned (41.1%)
No. of Valid Responses (%)	623 (24.9%)	1,203 (36.5%)	1,203 (36.5%)
Survey Method	Mail Survey	Mail Survey	Mail Survey

reconstruction process, are presented. For example, “I understood the entirety of the damage,” “I felt it was safe,” “I was prepared to have an uncomfortable life for quite some time,” “Office/school has resumed,” “We have completely dealt with housing issues,” “I no longer feel that I am a victim of the disaster.” Respondents were asked to mark the date on the calendar (from Jan. 17, 1995 to date) that they thought applicable to each event.

### Analysis

For each item, the horizontal axis represents the time elapsed after the disaster on a logarithmic scale (power of 10), and the vertical axis represents the cumulative percentage of positive respondents for each item. We believe that it is worthwhile to deal with the effects of emergencies such as disasters when greater than half of the disaster victims feel and behave in a given way. Accordingly, in this study, we have set the threshold as the point of time at which 50% (cumulative) of the respondents felt and behaved as described in the item.

## RESULTS AND DISCUSSION (1)

Figure 2 shows the reconstruction calendars of utilities and infrastructures (electricity, telephone system, sewage line, water line, transportation system, gas), housing, and work. **Restoration of utilities:** Our analysis shows that greater than 50% of the respondents replied that electricity and telephone service were restored in 10 hours, that sewage service was restored in 100 hours, and that water and gas supply, and transportation were restored between 100 and 1,000 hours.

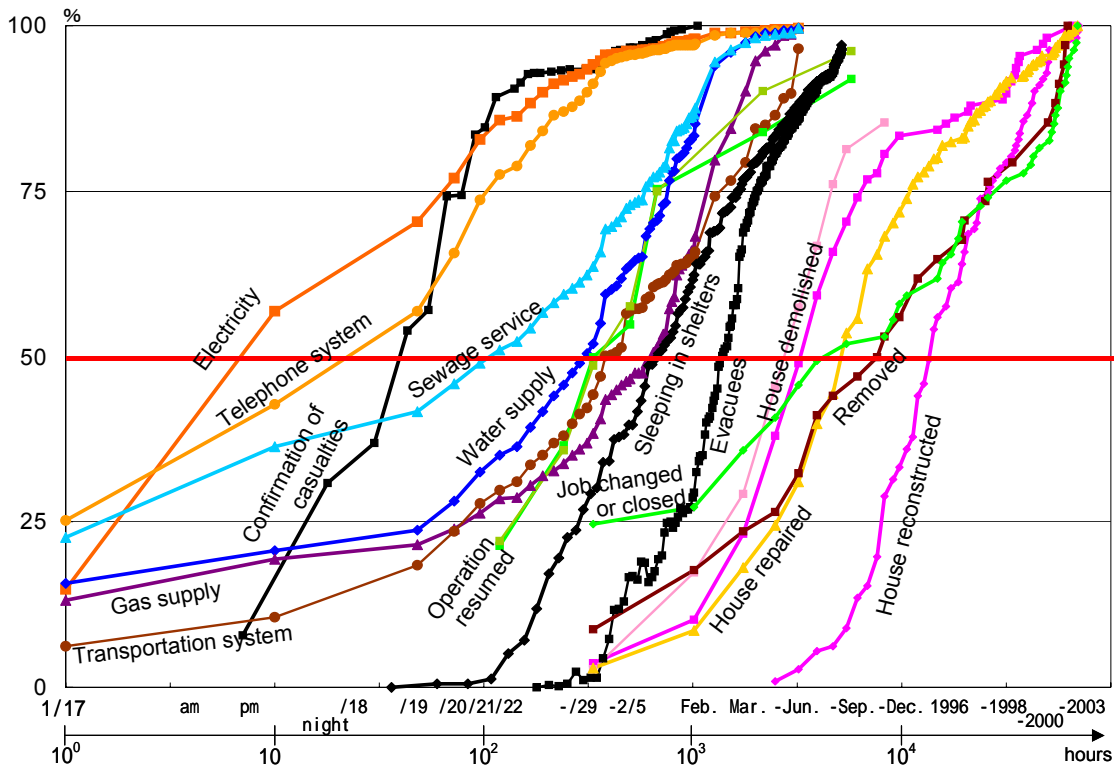


Figure 2: Reconstruction calendars of utilities and infrastructures, housing, and work

**Confirmation of the safety of family members:** On the day of the disaster, the evening newspapers began to report the number of identified bodies. The percentage of identified bodies exceeded 50% by two days after the disaster, and exceeded 90% by 100 hours. Many people have the impression that confirmation of the safety of family members took longer, but in reality, greater than 90% of the bodies were identified within 100 hours.

**Use of shelters:** The percentage of victims sleeping in shelters was little changed over the first 100 hours following the earthquake. Between 100 and 1,000 hours, the percentage of people who left the shelter (no longer slept in the shelter) increased sharply and exceeded 50% at 1,000 hours. The percentage of evacuees (those who received lunch boxes at the shelters) sharply decreased between 100 and 1,000 hours, and at 1,000 hours, the percentage of evacuees who left the shelter exceeded 50%. During this period, the restoration rate of all utilities and infrastructures (electricity, telephone system, sewage line, water line, transportation system, gas) exceeded 50%; therefore, it is to be expected that restoration of utilities and infrastructures allowed cooking and prompted people to return home.

**Rebuilding of houses:** Analysis of the times when replies to the items “damage was so serious that we were forced to move immediately”, “house was demolished,” and “house

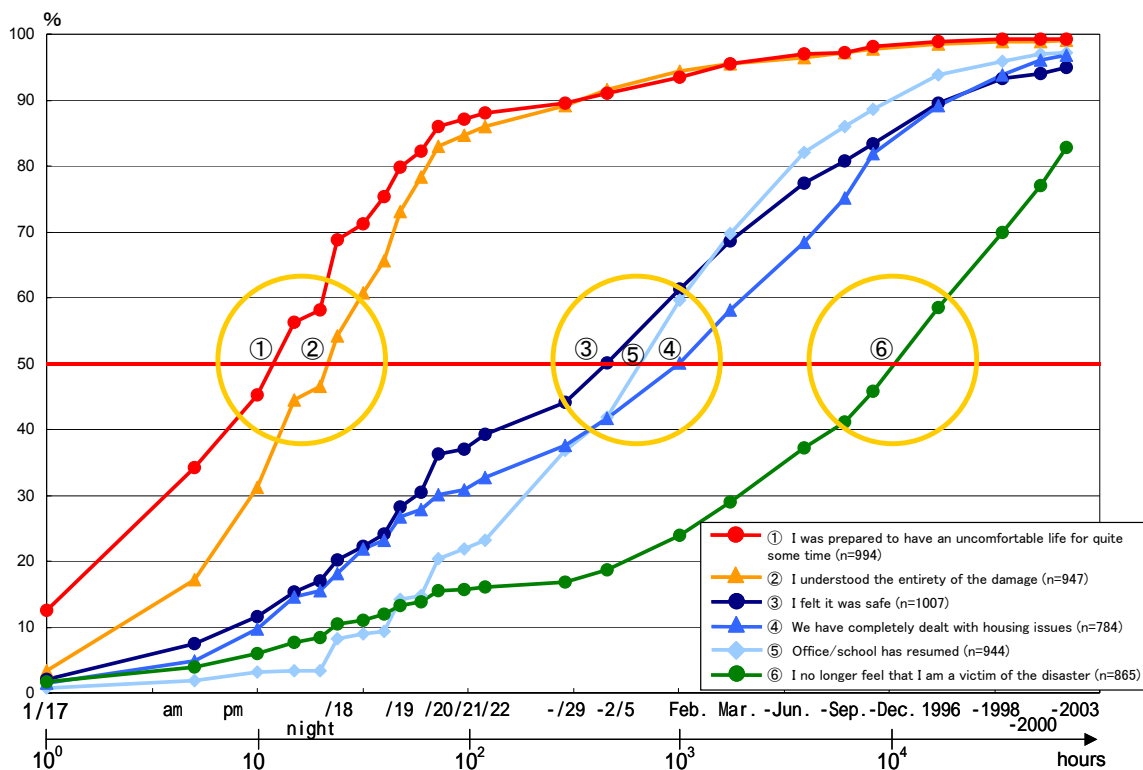


Figure 3: Reconstruction calendar

was repaired” exceeded the threshold demonstrated that various decisions related to houses were made between 1,000 and 10,000 hours. Furthermore, positive responses to the item “house was rebuilt” exceeded 50% at 10,000 hours. The “rebuilt” period changed in parallel with the “demolished” period, so we can estimate that rebuilding was completed approximately five months after demolition.

**Job changes:** The percentage of people who responded, “their office had resumed operation” exceeded 50% between 100 hours and 1,000 hours. “Leaving or changing jobs, and changing and closing the business” reached approximately 30% by 1,000 hours, and exceeded the threshold between 1,000 and 10,000 hours.

### Reconstruction calendar

Figure 3 shows a reconstruction calendar. By 10 hours (on the day of the disaster), the percentage of people who replied “I was prepared to have an uncomfortable life for quite some time.” and “I understood the entirety of the damage” exceeded 50%. By 1,000 hours (about a month after the disaster), the percentage of people who replied, “I felt it was safe”, “I have completely dealt with housing issues” and “Work/school had resumed” exceeded 50%. By 10,000 hours (about one year after the disaster), the percentage of people who replied, “I no longer feel that I am a disaster victim” exceeded 50%. These results

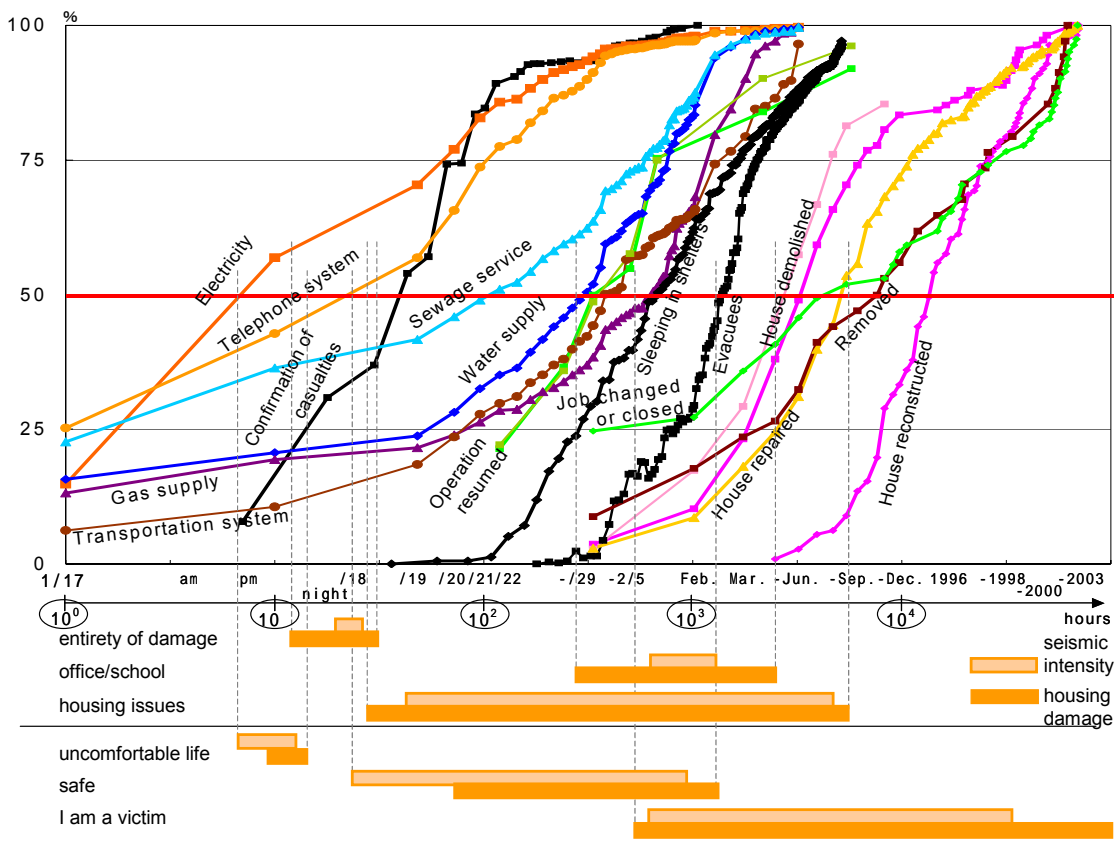


Figure 4: Collection of the results

demonstrate that the inflection points of the feelings and behaviors of disaster victims can be sorted on a logarithmic time axis.

## RESULTS AND DISCUSSION (2)

Figure 4 shows a collection of the results of the preceding section. The items on the reconstruction calendar are shown in the lower horizontal bar chart. This represents the range of time between the earliest and latest threshold crossings in our analysis of the reconstruction calendar items by the levels of seismic intensity and damage to housing structures. We regard this range as the period in which each item of the reconstruction calendar exceeded the threshold, and analyzed the relationships with the social situations shown in the upper part of the graph.

### **I was prepared to have an uncomfortable life for quite some time**

The time when people responded, “I was prepared to have an uncomfortable life for quite

some time” almost coincided with the time when “electricity was restored”. This was 10 hours after the outbreak of the disaster, about the time when the Disorientation Phase ended.

#### **I understood the entirety of the disaster**

The time when people responded, “I understood the entirety of the disaster” coincided with the time when “telephone service was restored” and “the safety of family members was confirmed.” This was 10 to 100 hours after the occurrence of the disaster, corresponding to the disaster-stricken society formation phase.

#### **We are safe by now**

The period in which people responded, “we are safe by now” corresponded to the period between the time when “telephone service was restored and the safety of family members was confirmed” and the time when “utilities began to be gradually restored” and “the percentage of people who left the shelters exceeded 50%”. This item shows variations according to the seismic intensity of the earthquake and the level of damage to houses, and ranged from the time when the disaster stricken society was formed to the period of Disaster Utopia.

#### **People settled housing problems**

The period in which “people settled housing problems” corresponded to the period mentioned above and continued until the time when “demolition or repair of houses was completed.” Depending on the seismic intensity and the level of damage to houses, it ranged from the time when the disaster stricken society was formed to the time when people returned to reality.

#### **Work/school resumed**

The period in which “work/school resumed” corresponded to the period in which “offices resumed business operations” exceeded 50% and “when most people left the shelters”; this was 1,000 hours after the occurrence of the disaster.

#### **No longer feel they were disaster victims**

The period in which people “no longer feel they were disaster victims” began at 1,000 hours after the occurrence of the disaster when utilities were restored, and still continued at the survey point at 100,000 hours after the disaster (eight years after the disaster: January 2003). When we examined this result relative to the level of damage to the house (Fig. 5), we found that greater than 50% of the people whose houses totally collapsed replied, “I still feel I am a victim of the disaster” at the survey point eight years after the disaster.

## **CONCLUSION**

In this paper, we have analyzed how the feelings and behavior of disaster victims, which



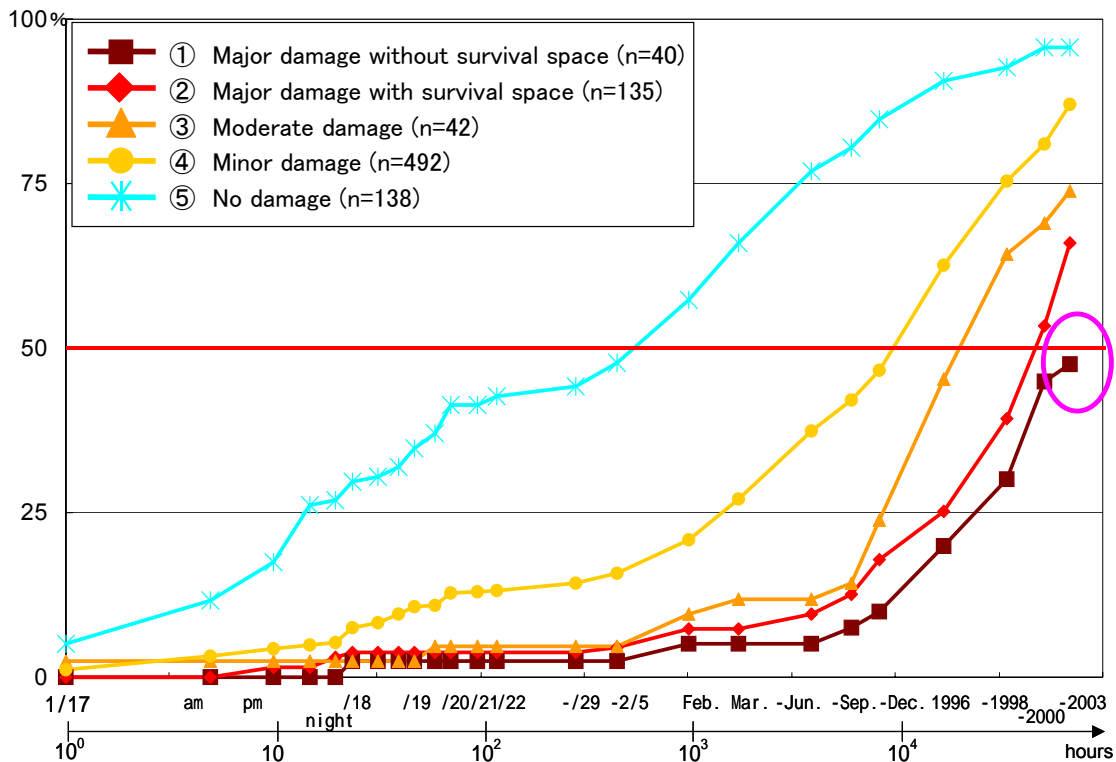


Figure 5: I no longer feel that I am a victim of the disaster

are considered milestones in the life reconstruction process, changed by elapsing psychological time. The results confirmed the hypothesis that the “time sense of disaster victims changes not according to physical time but according to psychological time on a logarithmic axis”. In this analysis, we also considered the relationship with the social situation of the time. We believe that the results of this study will contribute to generating more effective disaster measures and disaster prevention measures in which the feelings and behaviors of the victims are reflected.

In the future, we would like to analyze the psychological and behavioral patterns of disaster victims of disasters other than the Hanshin-Awaji Earthquake to verify the general applicability of these results to other disasters.

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