Review:

Recovery and Reconstruction Calendar

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We have developed a recovery and reconstruction calendar for clarifying the process that earthquake victims undergo in rebuilding their shattered lives. We have examined its reliability and stability and considered the generality of the process clarified by the proposed calendar. Concretely, based on results for the calendar in random surveys on the 1995 Great Hanshin-Awaji Earthquake and the 2004 Mid-Niigata Prefecture Earthquake, we concluded that (1) the recovery and reconstruction calendar is highly reliable and stable in clarifying the recovery and reconstruction process and (2) generalization can be recognized in this process in time phases after disasters despite differences in disaster size and mode.

Keywords: disaster process, life reconstruction process, psychological time, human behavior pattern, random sampled survey

1. Background

1.1. Long-Term Support

On January 17, 1995, the Great Hanshin-Awaji Earthquake Disaster struck, leaving 6,437 dead and missing, 104,906 houses totally destroyed, 144,274 houses partially destroyed, 9,926.8 billion yen in overall damage, and 16,300 billion yen in total reconstruction costs. In addition to material damage, this earthquake left behind a shattered infrastructure and social order whose effects are still being felt over a decade later.

In the process of recovery and reconstruction from catastrophic urban disaster, those responding to disasters in administrative organizations, etc., must support recovery of the social infrastructure such as construction and lifeline systems and economic reconstruction in stricken areas and reconstruction of victims' lives based on the long term. In 2000, 5 years after the earthquake, the local Kobe City government conducted a verification of reconstruction, finding that reconstruction consisted of three processes – urban, economic, and lifestyle – and that lifestyle reconstruction could be undertaken finally after completion of first two (Kobe City, 2000 [1]; Tamura, 2000 [2]; Hayashi (Eds.), 2000 [3]). So those responding to disasters may prepare for the future, they must understand the steps needed to reconstruct a life in the long term for victims and society and to provide appropriate support at each step.

1.2. Necessity to Understand Disaster Process

The process for recovering everyday life while people and society adapt to a post-disaster environment is called the disaster process or life recovery/reconstruction process if the lives of people are brought into focus. If the disaster process is understood objectively, the situation and needs of victims and their society can be realized by answering the following questions, which problems occur for whom in what sequence, and how these problems can be solved.

Such knowledge is not readily available for two reasons: First, few opportunities exist to collect knowledge because of catastrophic urban disaster rarity. Second, before the Great Hanshin-Awaji Earthquake, studies on disaster prevention in Japan centered on physical science and engineering, understanding of natural external forces and deterrence of damage, and clarification of reconstruction through an interdisciplinary approach did not exist on a full scale.

With many large earthquakes predicted in 21st century Japan, adaptation of victims and their society to a new environment must be clarified using those few cases such as the Great Hanshin-Awaji Earthquake, the 2004 Mid-Niigata Prefecture Earthquake, and the 2007 Mid-Niigata Prefecture Offshore Earthquake, and it is important that their knowledge and lessons be made available for improving effective measures before disasters and solving problems after disasters.

1.3. Clarification of the Disaster Process Through Ethnography Interviews

One way to understand the disaster process is to collect individual descriptions (ethnography) of victims and those responding to disasters in workshops and depicting the disaster from their viewpoints, called disaster ethnography. Among the few studies in Japan, Aono et al. (1998) [4] and Tanaka et al. (1999) [5] clarified behavioral patterns of victims after disasters, collecting and analyzing individual descriptions on disaster response in the Great Hanshin-Awaji Earthquake. The behavioral patterns of victims appear to change in four time phases divided by three time criteria – 10 hours (the day of the earthquake), 10^2 (100) hours (2-4 days after the earthquake), and 10^3 (1000) hours (two months after the earthquake). In other words, victims reconstruct their lives passing through 4 stages

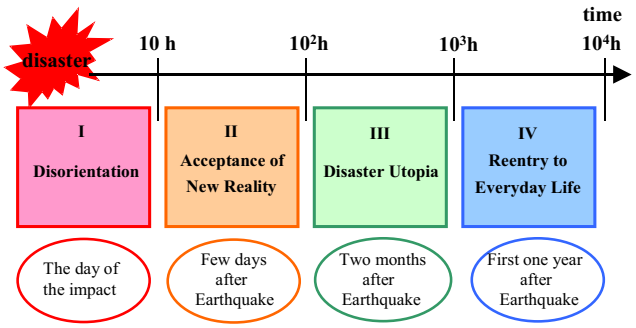

Fig. 1. Four Stages after the earthquake.

following an earthquake.

These four stages are defined as follows:

I. Disorientation phase – a period in which victims suffer from the impact of disaster so severely that they have difficulty in orienting themselves in the new environment.
II. Acceptance of new reality phase – a period in which victims accept damage rationally and undertake to adapt themselves to a new society based on a new order.
III. Disaster utopia phase – a period in which life resembling primitive communism forms based on social values different from those of ordinary times because of the paralysis of social function such as lifeline services.
IV. Reentry to everyday life phase – a period in which victims undertake to reconstruct their lives due to restoration of social infrastructures such as lifeline services (**Fig. 1**).

1.4. Objectives

While part of the disaster process was clarified through ethnography interviews, the following problems were pointed out:

1) If only individual experiences of victims are collected without grasping the overall disaster process, the masses without voices, basic materials for fair responses and measures against disaster are not worthwhile.

2) If no index indicating progress in reconstruction exists despite long interviews (one hour per case), responses and measures against disaster could not be evaluated and corrected in the process of recovery and reconstruction, which would not improve the quality of the disaster response.

We developed a recovery and reconstruction calendar for measuring overall reconstruction quantitatively for victims and stricken areas, clarifying the disaster process by ethnography interviews verified through quantitative examination. The idea that similar results can be obtained if asked several times was confirmed. By comparing and reviewing results obtained by the recovery and reconstruction calendar in multiple disasters, the generality of the disaster process was also verified.

Table 1. Overview of Great Hanshin-Awaji Earthquake Disaster survey.

	2003 Survey	2005 Survey
Surveyed Area	Areas where 7 on the Japanese seismic scale was recorded and gas was stopped + Kobe City Kita ward and Nishi ward	Areas where 7 on the Japanese seismic scale was recorded and gas was stopped + Kobe City Kita ward and Nishi ward
Surveyed Person	Man and woman 20years or older	Man and woman 20years or older
Sampling	Sampled from resident register using stratified two-stage sampling	Sampled from resident register using stratified two-stage sampling
Number of Surveyed Persons	3,300	3,300
Number of Effective Answers	1,203	1,028
Rate of Effective Answers	36.5%	31.2%
Method of Survey	Fill out questionnaire sent by mail and collect it by mail	Fill out questionnaire sent by mail and collect it by mail

2. Implementation of Survey

2.1. Overview

We use results from five random sampled surveys at two separate stricken areas as data. Two surveys were conducted in January 2003 and January 2005 at areas in the Hanshin-Awaji area in January 1995 and the remaining three in March 2005, October 2005, and October 2006 in the Niigata Prefecture area in October 2004 (two other random surveys conducted in January 1999 and January 2001 in the Hanshin-Awaji area are omitted here).

Table 1 outlines surveys. After sampling survey points randomly within a surveyed area using stratified two-stage sampling, those surveyed were sampled using probability proportional sampling to sample one person from one household based on resident registers at each point. Effective rates of answers in the five surveys, even in the survey in January 2005 10 years after the Hanshin-Awaji Earthquake, maintained a high rate of 31.2%. Considering that victims showed high interest in the earthquake and the questionnaire was devised to enable easy responses, findings are seen as highly reliable.

For survey and analysis of survey items other than the recovery and reconstruction calendar, refer to Hayashi (Eds.) 2004 [6] for the 2003 survey on the Great Hanshin-Awaji Earthquake Disaster, Kimura et al. [7], 2006, and Hayashi (Eds.) 2006 [8] for the 2003 survey, and Kimura et al., 2005 [9], for the survey in March 2005 on the Mid-Niigata Prefecture Earthquake.

2.2. Recovery and Reconstruction Calendar

To clarify the reconstruction process of victims and stricken areas, milestones in recovery and reconstruction

Month	day/ day of week	Event	A I understood the entirety of the damage.	B I felt safe.	C I was prepared to have an uncomfortable life for a while.	D Office/school have resumed.	E We have completely dealt with housing issues.	F I did not define myself as a victim of disaster.
1995								
January	17 Tue.	Occurrence of earthquake, Before dawn	1. 1/17 Before dawn	1. 1/17 Before dawn	1. 1/17 Before dawn	1. 1/17 Before dawn	1. 1/17 Before dawn	1. 1/17 Before dawn
		In the morning	2. That morning	2. That morning	2. That morning	2. That morning	2. That morning	2. That morning
		Afternoon	3. Afternoon	3. Afternoon	3. Afternoon	3. Afternoon	3. Afternoon	3. Afternoon
		Night	4. Night	4. Night	4. Night	4. Night	4. Night	4. Night
		Midnight	5. Midnight	5. Midnight	5. Midnight	5. Midnight	5. Midnight	5. Midnight
	18 Wed.	The day after the earthquake, Morning	6. 1/18 Morning	6. 1/18 Morning	6. 1/18 Morning	6. 1/18 Morning	6. 1/18 Morning	6. 1/18 Morning
		Afternoon	7. Afternoon	7. Afternoon	7. Afternoon	7. Afternoon	7. Afternoon	7. Afternoon
		Night	8. Night	8. Night	8. Night	8. Night	8. Night	8. Night
	19 Thu.	3 days after the earthquake, Daytime	9. 1/19 Daytime	9. 1/19 Daytime	9. 1/19 Daytime	9. 1/19 Daytime	9. 1/19 Daytime	9. 1/19 Daytime
		Night	10. Night	10. Night	10. Night	10. Night	10. Night	10. Night
	20 Fri.		11. 1/20	11. 1/20	11. 1/20	11. 1/20	11. 1/20	11. 1/20
	21 Sat.		12. 1/21	12. 1/21	12. 1/21	12. 1/21	12. 1/21	12. 1/21
	22 Sun.	First rain since the earthquake.	13. 1/22	13. 1/22	13. 1/22	13. 1/22	13. 1/22	13. 1/22
	23-29		14. 1/23-1/29	14. 1/23-1/29	14. 1/23-1/29	14. 1/23-1/29	14. 1/23-1/29	14. 1/23-1/29
	30-2/5		15. 1/30-2/5	15. 1/30-2/5	15. 1/30-2/5	15. 1/30-2/5	15. 1/30-2/5	15. 1/30-2/5
	February		16. February	16. February	16. February	16. February	16. February	16. February
	March		17. March	17. March	17. March	17. March	17. March	17. March
	April-June		18. Apr.-June	18. Apr.-June	18. Apr.-June	18. Apr.-June	18. Apr.-June	18. Apr.-June
	July-September		19. Jul.-Sep.	19. Jul.-Sep.	19. Jul.-Sep.	19. Jul.-Sep.	19. Jul.-Sep.	19. Jul.-Sep.
	October-December		20. Oct.-Dec.	20. Oct.-Dec.	20. Oct.-Dec.	20. Oct.-Dec.	20. Oct.-Dec.	20. Oct.-Dec.
1996			21. 1996	21. 1996	21. 1996	21. 1996	21. 1996	21. 1996
1997-1998			22. 1997-1998	22. 1997-1998	22. 1997-1998	22. 1997-1998	22. 1997-1998	22. 1997-1998
1999-2000			23. 1999-2000	23. 1999-2000	23. 1999-2000	23. 1999-2000	23. 1999-2000	23. 1999-2000
2001-Today			24. 2001-Today	24. 2001-Today	24. 2001-Today	24. 2001-Today	24. 2001-Today	24. 2001-Today
Not recovered today			25. Not recovered today	25. Not recovered today	25. Not recovered today	25. Not recovered today	25. Not recovered today	25. Not recovered today
Cannot remember			26. Cannot remember	26. Cannot remember	26. Cannot remember	26. Cannot remember	26. Cannot remember	26. Cannot remember

Fig. 2. Recovery and reconstruction calendar questions (2003 Great Hanshin-Awaji Earthquake survey). Circle the appropriate time for each of your feelings and behavior in A-F.

are mentioned in the social survey, questions ask when events happened and answers obtained. This set of procedures is called the recovery and reconstruction calendar.

Figure 2 shows questions for the first version in the 2003 survey and it remains unchanged.

An introduction precedes questions: "How victims in the stricken areas trace the process of restoration and reconstruction is unknown. Please review how your feelings and behavior changed over time since the earthquake and circle the number of the appropriate time on the calendar. Following the introduction, questions A-F are arranged as shown in **Fig. 2**. The 2003 survey had 6 options: I understood the entirety of the damage, I felt safe, I was prepared to have an uncomfortable life for a while, Office/school have resumed, We have completely dealt with housing issues, and I did not define myself as a disaster victim. We selected these milestones from of ethnography survey findings as events marking restoration and reconstruction many victims experienced.

We had respondents circle the appropriate day on the calendar (from January 17, 1995, when the earthquake struck, to today) arranged under question A-F. Answer options of Not recovered today and Cannot answer were added at the bottom of the calendar to avoid no answers and refusals to answer.

2.3. Interpreting the Recovery and Reconstruction Calendar

Figure 3 is the result of the 2003 survey using **Fig. 2**. The abscissa of **Fig. 3** shows the passage of time after earthquake occurrence. It shows the passage of time by logarithmic coordinate. The ordinate shows the percentage of those who answered I felt so / I did so by the point of time by cumulative line graph. Analysis was conducted by defining the point of time when the percentage exceeds 50% (i.e., half of all respondents answered I felt so / I did so) as that when feeling was so felt (the behavior was do done). And the number of those who did not answer was excluded.

The reason for setting a 50% threshold is based on the study objective of quantitatively understanding the overall disaster process for all victims to ensure appropriate response and measures against disasters. Implementing responses and measures under changing

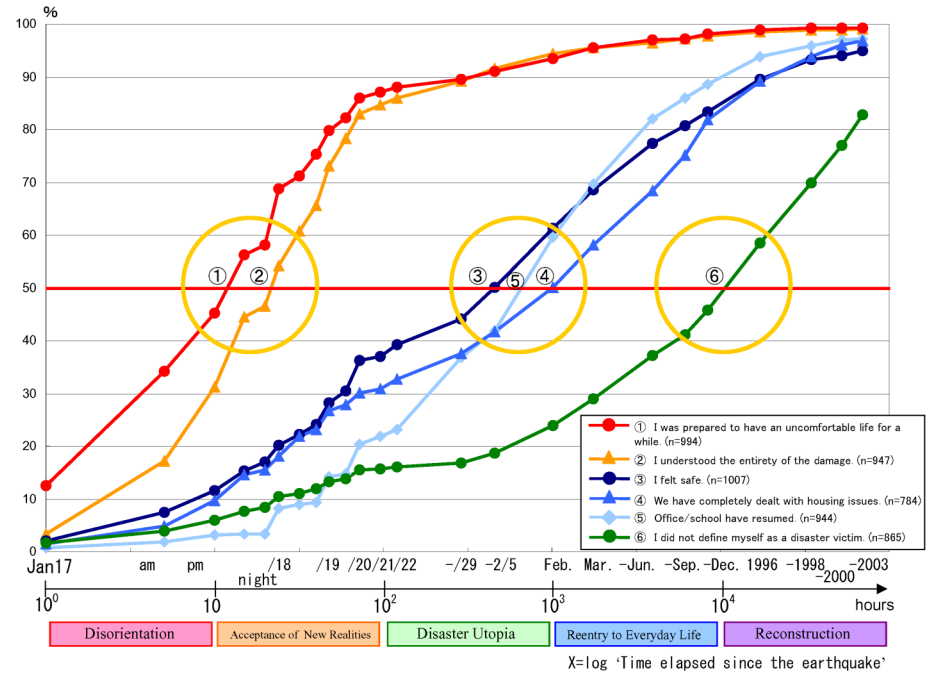

Fig. 3. Recovery and Reconstruction Calendar Jan/2003.

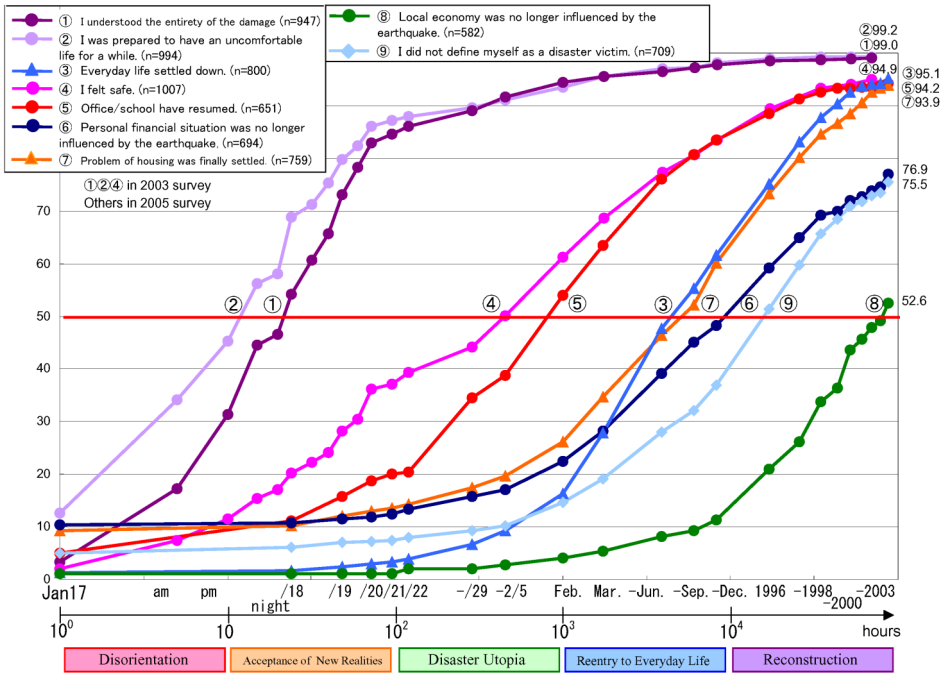

Fig. 4. Recovery and Reconstruction Calendar (Hanshin-Awaji Survey in Jan./2003 and Jan./2005).

postdisaster circumstances requires judgment implementation criteria. If over half (50%) of victims are under certain awareness and behavior, governments could decide to implement responses and measures based on this fact. Given that responses and measures for over half of victims would be fair and effective, we used the 50% threshold for analysis and discussion in this study.

Reviewing the results in **Fig. 3**, six feelings and behaviors as milestones of recovery and reconstruction collected around three points of time – 100 hours, 1,000 hours and 10,000 hours after the earthquake. First, 10 hours after the earthquake, victims prepared to have an uncomfortable life for a while (on the night of the earthquake, 56.3%) and thereafter understood the entirety of the damage (on the morning of the day after

the earthquake, 54.2%).

At 1,000 hours, over half of victims responded that they felt safe – 50.1% three weeks after the earthquake; offices and school had resumed operation – 59.7% in the month following the earthquake; and housing issues had all been dealt with – 50.2% in the month following the earthquake. These conditions thus hold for the majority of victims in stricken areas. At 10,000 hours after the earthquake, they did not define themselves as a victim of disaster (one year after the earthquake, 58.5%). At the time of this survey (January 2003), 8h years after the earthquake, we found that 82.8% of respondents did not define themselves as victims of disaster, while 17.2% did. These results show that the process of recovery and reconstruction in stricken areas can be grasped quantitatively using the recovery and reconstruction calendar.

2.4. Victim Psychology

Time criteria corresponding to changes in the process of life reconstruction are set at powers of 10, i.e., 10 hours, 100 hours, and 1,000 hours, based on the psychological theory that "human sense changes in proportion to the logarithm of stimulus intensity." German physiologists E. H. Weber and G. H. Fechner proposed Weber-Fechner's Law, i.e., "if a stimulus changes based on arithmetic progression, a response changes in proportion to the logarithmic function."

Applying this law to human psychological timing in a disaster, we assumed that no difference existed in human psychological sense between the stimulus from the first hour to 10 hours, that from 10 to 100 hours, and that from 100 to 1,000 hours after a disaster. The more stimuli are given, the longer the sense of human psychological time feels beyond actual physical time (Matsuda (Eds.), 1996 [10]). Based on these presumptions, we assumed the timing using the power of 10.

Human psychological time is not likely to be reflected in a social system because it is difficult to establish an objective scale. In fact, we think and behave ordinarily based on human psychological timing, so "the common timing to all the victims" is an important factor. The passage of the human psychological time is adopted as abscissa of the calendar for clarifying the disaster process of victims to take effective measures for them.

3. Results of Recovery and Reconstruction Calendar

3.1. Recovery and Reconstruction Calendar of the Great Hanshin-Awaji Earthquake

In January 2005, two years after the survey in **Fig. 2**, questions based on the recovery and reconstruction calendar were asked again in the same surveyed areas. This survey was to clarify the process of life reconstruction over the long term. We added 6 new of milestones to meet this objective, i.e., Office / school have resumed, Problem of housing was finally settled, Personal financial situation was no longer influenced by the earthquake, Everyday life settled down, I did not define myself as a disaster victim and Local economy was no longer influenced by the earthquake. Adding three other same question asked in the 2003 survey, we had 9 questions in all for the recovery and reconstruction calendar.

Figure 4 shows results. At 10 hours after the earthquake and disorientation phase, victims prepared to have an uncomfortable life for a while (the night of the day of the earthquake, 56.3%) and understood the entirety of the damage (on the morning of the day after the earthquake, 54.2%). Three weeks after the earthquake, they felt safe (50.1%). The percentage who answered office / school have resumed exceeded 50% one month (1,000 hours) after the earthquake when disaster utopia phase finished (54.1%) and 94.2% answered so 10 years after the earthquake (in the survey). Each percentage of those who answered everyday life settled down and problem of housing was finally settled exceeded 50% about half a year after the earthquake, which corresponds to reentry to the everyday life phase (55.3%, 52.2%). We supposed that many people felt that everyday life settled down by settling their housing problems.

The percentage of those who answered personal financial situation was no longer influenced by the earthquake exceeded 50% one year (10,000 hours) after the earthquake (59.2%). 76.9% answered so 10 years after the earthquake (at the survey). The percentage of those who answered I did not define myself as a disaster victim exceeded 50% one year (10,000 hours) after the earthquake (51.5%). 75.5% answered so in 2005 when the survey was conducted.

We also found that the number of respondents who felt local economy was no longer influenced by the earthquake exceeded the majority (52.6%) 10 years after the earthquake at the survey. In areas stricken by a catastrophic urban disaster, it can be seen that 10 years after the earthquake, The local economy had finally recovered from the earthquake's influence, indicating that response and measures would have to span up to a decade after a great quake to recover and reconstruct a modern society.

Although over 50% of victims no longer felt influenced, a look at individual life reconstruction suggests that over 40% still lived with the feeling that local society had not yet recovered from the disaster. This indicates the need for careful support in life reconstruction among individual victims for at least 10 years.

3.2. Recovery and Reconstruction Calendar of the Mid Niigata Prefecture Earthquake

On October 23, 2004, the Mid Niigata Prefecture Earthquake left 67 dead, 3,175 totally destroyed houses,

Table 2. Overview of survey on the Mid Niigata Prefecture Earthquake.

	Survey in March 2005	Survey in March 2006	Survey in October 2006
Surveyed Area	All of Ojiya City and Kawaguchi Town	Areas in Nagaoka City, Ojiya City, and Kawaguchi Town, where 6 lower on the Japanese seismic scale was recorded	Areas in Nagaoka City, Ojiya City, and Kawaguchi Town, where 6 lower on the Japanese seismic scale was recorded
Surveyed Person	Man and woman 20 years or older	Man and woman 20 years or older	Man and woman 20 years or older
Sampling	Sampled from resident register using stratified two-stage sampling (43 points in Ojiya City, 7 points in Kawaguchi Town)	Sampled from resident register using stratified two-stage sampling (each 50 points in Nagaoka City and Ojiya City, 7 points in Kawaguchi Town, 20 residents per point)	Sampled from resident register using stratified two-stage sampling (each 50 points in Nagaoka City and Ojiya City, 7 points in Kawaguchi Town, 20 residents per point)
Number of Surveyed Persons	1,000	2,140	2,140
Number of Effective Answers	518	907	1,013
Rate of Effective Answers	51.8%	42.4%	47.3%
Method of Survey	Fill out questionnaire sent by mail and collect it by mail	Fill out questionnaire sent by mail and collect it by mail	Fill out questionnaire sent by mail and collect it by mail

13,804 partially destroyed houses, and about 3 trillion yen in overall damage. Applying earlier surveys on the Hanshin-Awaji Earthquake to this, we conducted surveys in March 2005, half a year after the earthquake, in October 2005 one year after the earthquake, and in October 2006, two years after the earthquake. For the recovery and reconstruction calendar, we used 10 items in October 2005 and added one more, making 11 in the October 2006 survey (**Table 2**).

Figure 5 shows the recovery and reconstruction calendar in October 2006. For I was prepared to have an uncomfortable life for a while, it took 10 hours (the day after the earthquake, 63.5%), which corresponds to the time for overcoming disorientation to understanding the disaster. It took 5 days for acceptance of the new reality phase to finish to understand damage (6 days after the earthquake, 50.0%). It took more time to grasp the scale of damage, because the disaster occurred in a mountainous area far different than in the urban Hanshin-Awaji Earthquake. After one week, office and school began to resume rapidly and 53.2% answered that they had resumed two weeks after the earthquake.

For other questions, the percentage exceeded the majority of 1,000 hours after the earthquake when heavy winter snows began to melt in stricken areas. The percentage of those who answered everyday life settled down and I felt safe exceeded the majority in March 2005, about half a year after the earthquake (56.6%, 52.7%). From spring, the number of respondents who answered local activity was restored (8 months after the earthquake, 60.1%) and problem of housing was settled (about 8-11 month after the earthquake, 54.7%) increased notably.

At one year after the earthquake, the numbers of respondents who answered personal financial situation was no longer influenced by the earthquake (about one year after the earthquake, 54.2%) and I did not define myself as a disaster victim (about one year after the earthquake, 50.0%) increased notably. It took one year and a half until the percentage of those who answered local roads were reconstructed exceeded the majority (53.4%). Even at the time of the survey, about two years after the earthquake, the percentage of those who answered local economy is influenced by the earthquake exceeded the majority, suggesting that it will take much more time to restore local economy and individual lives.

We concluded that the disaster process clarified through the recovery and reconstruction calendar corresponds to the divisions of phases indicated by ethnography interviews in many points.

3.3. Analysis Using the Recovery and Reconstruction Calendar

Kimura et al. (2004) (2005) [11, 12] analyzed in detail victim awareness and behavior in human psychological time and their correlation to the social situation by plotting questions asking about time concerning housing, jobs, and availability of lifeline services, and statistical social data such as on evacuees in shelters over time on the recovery and reconstruction calendar. Seismic intensity and housing damage were taken as factors influencing the process of life reconstruction on the recovery and reconstruction calendar, and clarified the influence each of the factors had on the process of life reconstruction.

We found that the indication on the recovery and reconstruction calendar applies to questions other than those on the calendar, and it is made clear using the calendar how differences in factors such as individual personal factors or the degree of damage influence reconstruction.

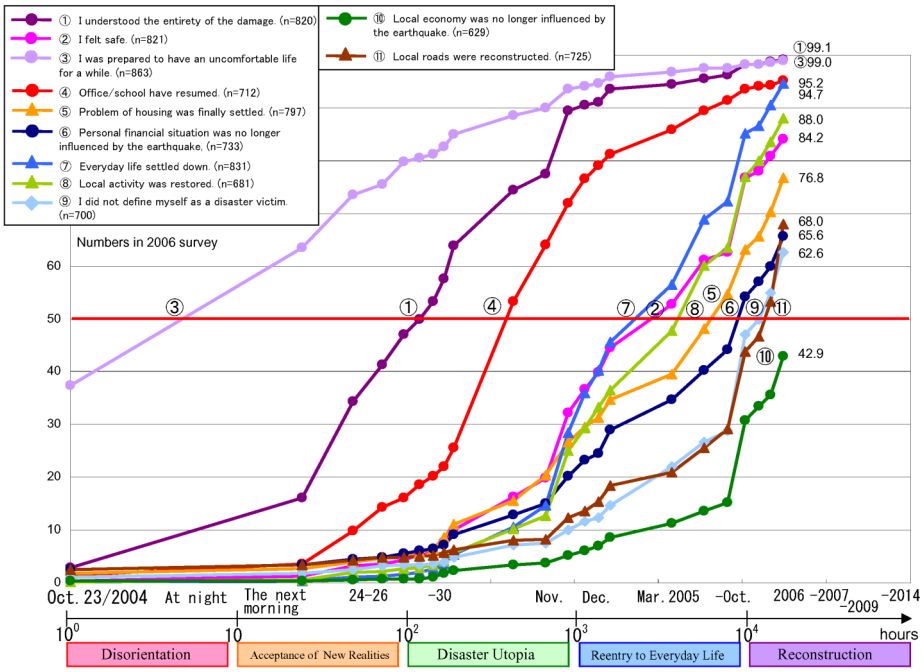

Fig. 5. Recovery and Reconstruction Calendar (Mid Niigata Survey in Oct./2006).

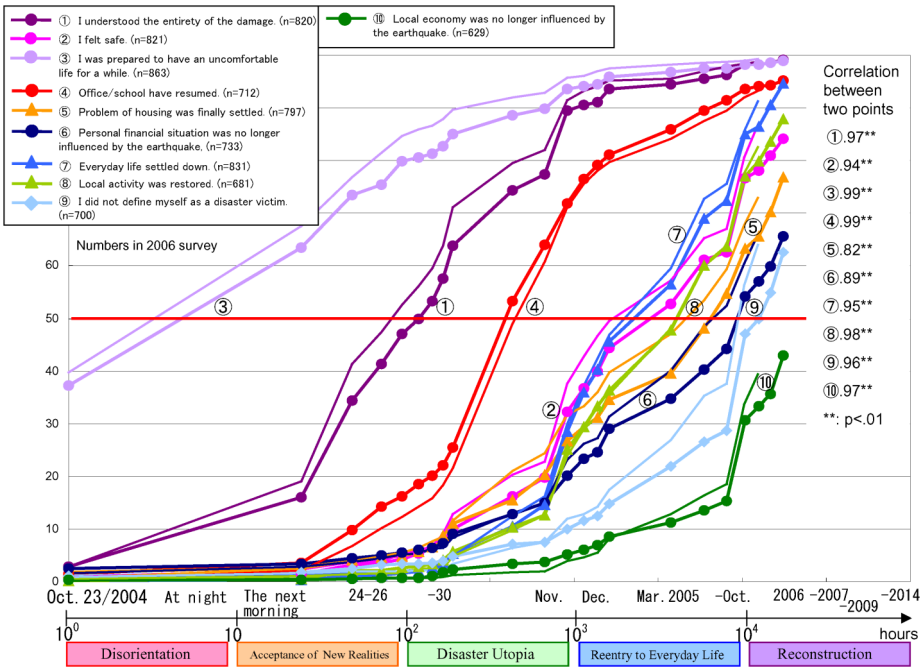

Fig. 6. Recovery and Reconstruction Calendar (Fine lines show results in Mar./2005 and bold lines in Oct./2006).

4. Calendar Reliability and Stability

To determine the calendar's reliability and stability, whether the calendar could be understood by respondents and answered similarly, other respondents sampled within the same surveyed areas were asked to answer the same questions multiple times.

Figure 6 shows results of overlapping 10 overlapping questions in surveys in 2005 and 2006 in the same areas surveyed in the Niigata Earthquake. Fine lines show results in 2005 and bold lines in 2006. We recognized many common points, for example, how the percentage of recovery and reconstruction rises in each item and the time when each item exceeds the majority.

In results of surveys in 2005 and 2006, the increase between two points in time, from one point to the next,

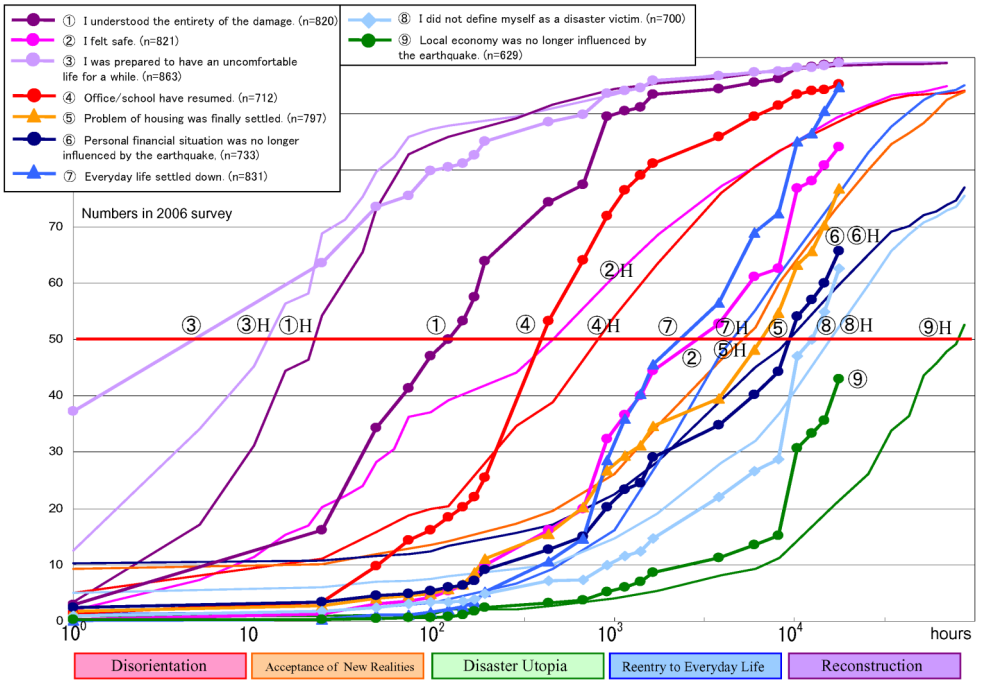

Fig. 7. Recovery and Reconstruction Calendar (Fine lines with the letter H show results in Hanshin-Awaji and bold lines in Mid Niigata).

was found and the correlation was calculated. As shown in **Fig. 6**, every item indicates a high degree of correlation in the range from .80 to .99 and is statistically significant at a level of less than 1%.

In the Hanshin-Awaji Earthquake, two overlapping questions asked in both surveys were examined and a high degree of correspondence found for each.

We concluded from results that the proposed recovery and reconstruction calendar has significantly high reliability and stability.

5. Generality of Process of Life Reconstruction

Reviewing the question of how multiple disasters can be compared and examined using the recovery and reconstruction calendar, we found that the recovery and reconstruction calendar in the Great Hanshin-Awaji Earthquake Disaster and that in the Mid Niigata Prefecture Earthquake overlapped (**Fig. 7**).

In **Fig. 7**, fine lines with the letter H show results of the survey in the Hanshin-Awaji Earthquake and bold lines those of that in the Niigata Earthquake.

Summarizing the disaster process for the two earthquakes, victims prepared to have an uncomfortable life for a while within the first 10 hours after the earthquake. The problem at this time is how to get out of disorientation. Next, the problem solved 10-100 hours (2-4 days) after the earthquake is to understand the entirety of the damage. In the acceptance of a new reality phase, damage was grasped while confirming the safety of people, rescuing and saving the victims, and preventing secondary disasters. We found that by this phase, damage was understood both in a catastrophic urban disaster and in mountainous areas.

The problem solved 100-1,000 hours (two months) after the earthquake was the item office / school have resumed. In disaster utopia phase represented by life at shelters, recovery of the office and school are important along with solving housing problems. And in the Hanshin-Awaji Earthquake, the number of respondents who answered I felt safe exceeded the majority in this phase. In the Niigata Earthquake, the victims felt safe after spring snow melted, so views on what safety means differed with the stricken area.

At 1,000-10,000 hours (about one year) after the earthquake, problems solved included those of housing settled, everyday life settled down, and personal financial situations no longer influenced by the earthquake. Although the two earthquakes differed in disaster scale and mode, the reconstruction of housing and that of personal financial situations, basic problems in life reconstruction, were solved in the same phase. Along with such reconstruction, victims felt that everyday life settled down. Accordingly it is thought that these processes represent the generality of the process of life reconstruction.

At 10,000 hours after the earthquake, the number of respondents who answered I did not define myself as a disaster victim exceeded the majority. This occurred about one year after either earthquake, so it appears important to take responses and measures against disaster for victims to return from emergency to ordinary life, setting the first anniversary as one objective. As for

the item local economy was no longer influenced by the earthquake, the majority was exceeded finally about 10 years (100,000 hours) after the Hanshin-Awaji Earthquake, while the local economy was still influenced by the earthquake two years after the Niigata Earthquake.

The process of life reconstruction in the Hanshin-Awaji Earthquake and in the Niigata Earthquake showed many common elements despite is significant differences in damage scale and mode. We thus concluded that generality exists in time and order in the process of life reconstruction. We will examine the generality of the recovery and reconstruction calendar by increasing the disaster cases and continuing more studies.

6. Projected Work

We have proposed a recovery and reconstruction calendar, for clarifying the process earthquake victims undergo in rebuilding their shattered lives. We have examined its reliability and stability and considered the generality of the process clarified by the proposed calendar. While targeting the entire stricken area, this calendar presents useful basic materials for disaster response such as administrative organizations that must act to understand the actual situation in the stricken area and orient responses and measures against future disasters. Although this process may be traced through interviews and documentaries, as TV and newspapers often do, too often the cases of "quiet" victims are lost in the clamor and they are left to drop through the safety net.

We plan to improve the recovery and reconstruction calendar and to study milestones by asking ourselves three questions – how the process can be traced, how the recovery and reconstruction calendar can be used in small- and large-scale social surveys, and how results obtained using the calendar can be applied concretely in disaster response.

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Japan Institute of Social Safety Science
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