

Overall Image of Nuclear Tests among Inhabitants in the Semipalatinsk Area

HIRABAYASHI Kyoko¹, SATOH Kenichi¹, MULDAGALIYEV Talgat², APSALIKOV Kazbek²,
KAWANO Noriyuki³

¹*Research Institute for Radiation Biology and Medicine, Hiroshima University*
hirabayashikyoko@gmail.com

²*Kazakh Scientific Research Institute of Radiation Medicine and Ecology*

³*Institute for Peace Science, Hiroshima University*

Abstract

The present paper is an attempt at describing overall image of nuclear tests for the residents at Semipalatinsk, Kazakhstan. Our research team conducted the survey by interview from 2002 to collect testimonies of inhabitants. We analyzed testimonies using the hierarchical clustering method and the multi-dimensional scaling method. The result showed that there are two different types of appeal in residents' mind. One is the complaint for the present condition – especially about the health of one's family and one's own. The other is the memory at the testing time.

Our results suggest that the most impressive memories for the inhabitants are “mushroom cloud”, “flash light”, “waving of the ground” and “Evacuation to the outside”. The experiences of “waving of the ground” and “evacuation to the outside” are peculiar to the Semipalatinsk residents. For the residents near the SNTS the greatest concern at present is their health problems. They still struggle with their diseases, family's death even though 20 years has passed since the last nuclear test.

INTRODUCTION

From 1949 to 1989, over the four hundred times of nuclear tests had conducted at Semipalatinsk Nuclear Test Site (SNTS)^{[1],[2]} - that is one of the negative legacy of the former Soviet Union. It is said that several hundred thousand people have been affected by radiation exposure around this area^[3]. There is a possibility that most residents still have trouble with many kinds of symptoms^[4].

Our research team began interviewing the inhabitants of villages near the SNTS in 2002 to investigate their health status, their experiences of the nuclear explosions, psychological effects caused by those experiences, and the routes of exposure^{[5],[6]}. The present research focuses upon the inhabitants themselves, that is, we tried to clarify the realities of Semipalatinsk by listening to first-hand accounts from the victims. With the information about the victims' personal experiences, we expected to be able to provide a more complete picture of the radiation effects in and around Semipalatinsk.

MATERIALS AND METHODS

For this research, we use the data from 2002 to 2007 surveys. In those years we have conducted surveys on six occasions covering 26 villages near the SNTS (see Figure 1). The study subjects comprise persons who experienced the nuclear tests on the ground between 1949 and 1962 in each village and persons who currently reside there. We selected the subjects at random.

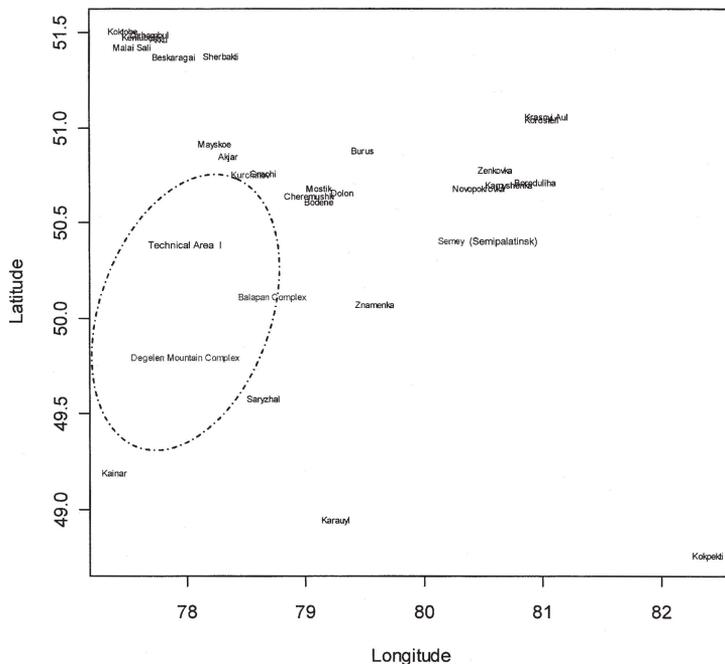


Figure 1. Semipalatinsk Nuclear Test Site (SNTS) and the target villages (except Semei and Kurchatov)

All testimonies were translated into Japanese. As an exception, the survey in 2006 there are 88 testimonies in Kazakh language which haven't been translated into Japanese. So we excluded them from our analysis.

First, we selected the words of high frequency from testimonies. Then we analyzed those words using the hierarchical clustering method and the multi-dimensional scaling method^{[7],[8]}.

The open-ended survey question about experience and testimonies concerning nuclear test is as follows;

“Please write about anything concerning the nuclear tests that cannot be forgotten, that still haunts you, that you regret, or any opinions about nuclear test in detail in the space provided below. You may write about your experiences, or that of your family or your close neighbors.”

RESULTS AND DISCUSSIONS

Table 1 shows the number of respondents. There were 395 males and 549 females. The total number of testimonies was 944. Average age of the subjects was 64.88 ± 8.97 years old.

Table 2 shows the words which are used more than 50 times in testimonies. We selected all nouns, adverbs, adjectives and the verbs relating to the experiences of nuclear tests^{[9],[10]}. We analyzed testimonies in Japanese then translated into English for this paper. The words - “explosion”, “see”, “house”, “test”, “polygon” and “mushroom cloud”- are the highest frequency.

Table 1. The number of respondents classified by sex in each village

Year of survey	Village	Male	Female	Total
2002	Dolon	6	13	19
	Kainar	29	19	48
	Kokpekti	7	16	23
	Saryzhal	29	19	48
2003	Dolon	4	5	9
	Kainar	1	5	6
	Karauyl	13	18	31
	Kokpekti	3	6	9
	Saryzhal	13	6	19
	Znamenka	7	6	13
2004	Bodene	24	21	45
	Burus	14	26	40
	Cheremushki	20	21	41
	Grachi	9	19	28
	Mostik	23	22	45
	Znamenka	15	20	35
	Institute*	0	3	3
2005	Boroduliha	8	21	29
	Kamyshenka	8	9	17
	Korosteli	4	9	13
	Krasnyi	11	13	24
	Novopokrovka	16	18	34
	Zenkovka	8	15	23
2006	Akku	19	27	46
	Beskaragai	17	32	49
	Dzhambul	20	26	46
	Sherbakti	19	30	49
2007	Akjar	6	20	26
	Kentubek	10	24	34
	Koktobe	10	11	21
	Malai	12	21	33
	Mayskoe	10	28	38
Total		395	549	944

*In 2004 we interviewed the 3 patients at the hospital of Kazakh Scientific Research Institute of Radiation Medicine and Ecology.

Table 2. 60 words of high frequency used in testimonies (50 times or more)

Order	Word	Frequency in total	Order	Word	Frequency in total
1	explosion	868	31	ravine	97
2	see	600	32	give	96
3	house	445	33	go up	93
4	test	436	34	close	90
5	polygon	346	35	cloud	89
6	mushroom cloud	312	36	lie down	81
7	nuclear	260	37	school	80
8	window	260	38	strong	79
9	remember	253	39	get (sick)	78
10	disease	251	40	die	77
11	child	234	41	resident	73
12	outside	208	42	many	72
13	influence	201	43	now	71
14	soldier	197	44	at that time	69
15	village	171	45	door	67
16	shake	167	46	break	66
17	everyone	163	47	cancer	62
18	die	144	48	shake	62
19	be taken to	137	49	husband	61
20	sky	132	50	parent	61
21	feel	130	51	district	60
22	person	130	52	blast wave	58
23	glass	128	53	bright	57
24	ground	121	54	be born	57
25	health	116	55	invalid	57
26	now	115	56	blow (off, away)	55
27	people	113	57	son	54
28	first	110	58	dish	53
29	all	109	59	receive (pension)	52
30	light	102	60	pension	51

Some verbs have various meanings, we provided the objects or adverbs in () due to understand clearly.

Next we calculated the distances of each word based on the frequency of appearance simultaneously in the same testimonies of one person. Then we classified those 60 words through the hierarchical clustering method (see Figure 2). It means that if the distance is closer, the possibility of using these words simultaneously will be greater. The following testimony is one of examples, which includes the words of “die”, “cancer” and “husband” together;

Test site took millions of people's lives, mortality is very high. Almost all my relatives died. Husband died of cancer as well as my son. Many people died in my house and all of them died of cancer. We need peace, quite life, welfare. We spend a lot for medicine. Free medical service is needed. (Female, 76 years old, Borodulicha)

The result shows that the testimonies of inhabitants are divided into two groups. In the upper group, we can see the words of “health”, “die”, “invalid”, “disease” and “cancer” and so on. These words are related to their health condition. The words like “child”, “son”, “parent” and “husband” indicate the family

experience of shaking of the ground. (5)The words of “ravine”, “outside” and “lie down” suggest the experience of evacuation to the outside.

Figure 3 described the distances among the words more visually by using multi-dimensional scaling method. This figure also shows the same result as figure 2. The words can be divided into two groups. One is the complaint for the present condition .The other is the memory at the testing time. Some remarkable samples of testimonies are in the Appendix.

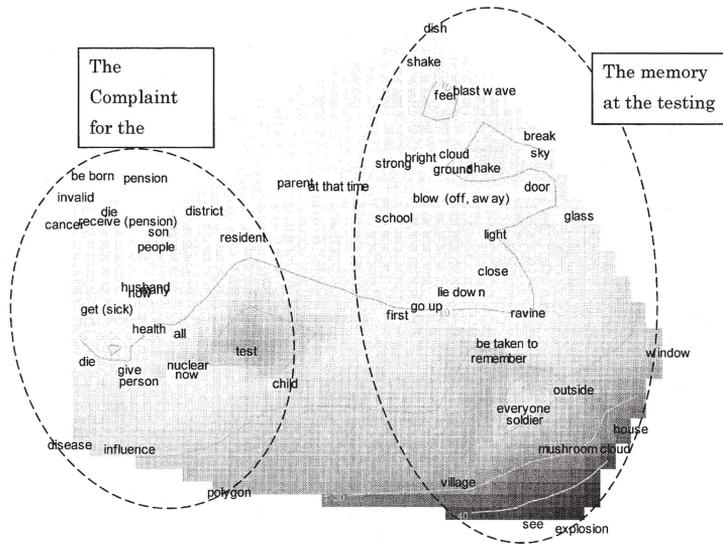


Figure 3. Result of the multi-dimensional scaling method

CONCLUSION

As a result of the statistical analysis, testimonies were divided into two main components. One is the memory at the testing time. The most impressive memories for the inhabitants are (1) mushroom cloud, (2) blast wave, (3) flash light, (4) waving of the ground, (5) evacuation to the outside. Especially, the experiences of “waving of the ground” and “evacuation to the outside” are unique to Semipalatinsk inhabitants.

The other is the complaint for the present condition. Particularly, residents near the SNTS suffered from some kinds of diseases. Their family also struggle with their diseases and have the fear of death. The experiences of nuclear tests at Semipalatinsk still have an influence upon the inhabitants’ health, life and mind even though more than 20 years has passed since the last nuclear test.

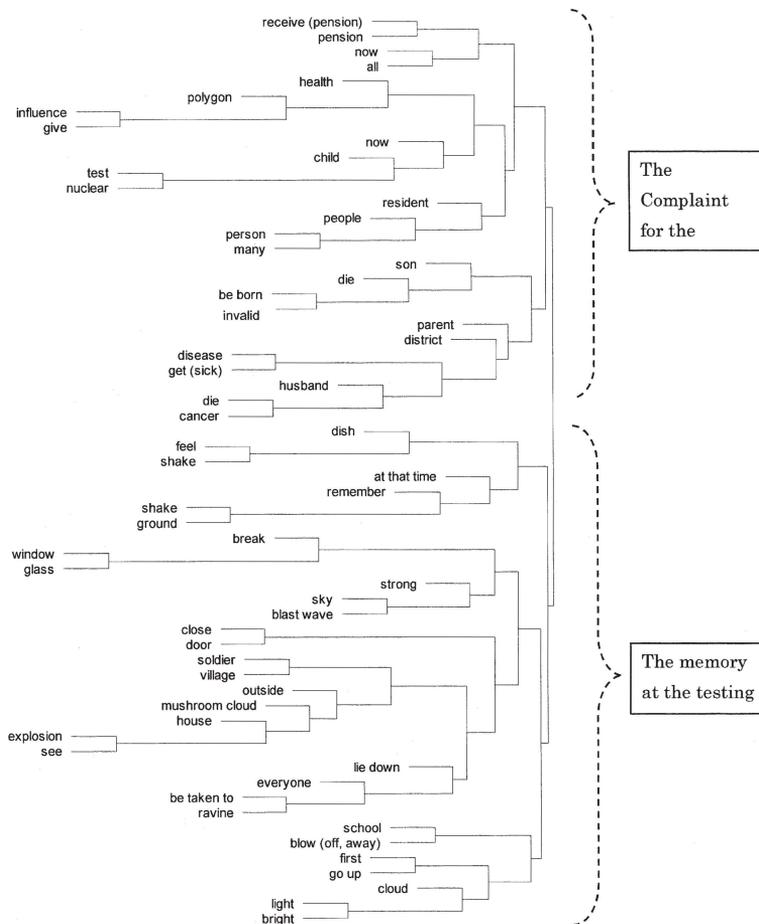


Figure 2. Result of the hierarchical clustering method

members. These facts show that this group indicates residents' mind of the complaint for the present condition, especially about the health of one's family and one's own.

The other group includes the words of "shake", "ground", "blast wave", "mushroom cloud", "ravine", "light", and "bright" and so on. These words indicate the memory at the testing time of residents'. Five kinds of experiences are suggested by those words. (1)The words of "mushroom cloud", "cloud", "go up" and "sky" suggest the experience of seeing mushroom cloud. (2)The words of "blast wave", "blow off" "blow away" suggest the experience of blast wave. (3)The words of "light", "bright" suggest the experience of flash light. (4)The words of "shake", "ground", "break", "glass" and "window" suggest the

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The complaint for the present condition

- ◆ All my life I never suspected that the nuclear tests could do so much damage to people's health. Now I experience the consequences of nuclear tests myself. My parents died from cancer, one of my grandchildren is a cripple from birth, and I myself have acute leukemia, which is a death sentence. I feel fear for the future of my children, as these consequences will never leave them. ----(F 1935 Saryzhal)

The memory at the testing time

(1) Mushroom cloud

- ◆ ----There was something in the shape of a mushroom in the sky, the dark cloud rose into the sky. For us children it was interesting, and we watched the sky. ----(M 1942 Kainar)
- ◆ In the fall of 1955 I saw the burning fire and a mushroom cloud. The clay rained from our wooden house, the fire from the stove dropped on the floor, and the windows were smashed.----(F 1927 Dolon)

(2) Blast wave

- ◆ ----First, there was thunder and then blast wave went through. It was like a very strong wind howling in the forest. Some houses had their windows broken and the stoves' shuts opened.----(M 1929 Mostik)
- ◆ ---- I felt underground jerks, blast-wave. Furniture was shaking in houses.---- (M 1959 Dzhambul)

(3) Flash light

- ◆ ---- We were grazing cattle when a glint flashed as bright as the sun, then the blast wave came, smut erupted out of the stove.----(M 1927 Dolon)
- ◆ ----But I remember that I saw the bright flashes, the rumble, like a thunder, the earth trembled and the windowpanes were smashed.----(M 1941 Kainar)

(4) Shaking of the ground

- ◆ I remember that when I was about 10 years old, dishes, panes, windows in our house were shaking and clinking. I thought that it was an earthquake. (F 1941 Zenkovka)
- ◆ I haven't seen explosions themselves but I felt when the ground was shaking. We all knew that that were explosions.(F 1924 Novopokrovka)

(5) Evacuation to the outside

- ◆ ----When we were children, it was announced that we all must go outside, we had been hiding in a ravine; for us, children, that was very interesting. ----(M 1946 Dolon)

Note: () indicates Male or Female/ birth year/ village. ---- indicates omission of sentences.