



# Effects of Tsunami and Nuclear Disaster on Children's Time Perspective

## -A Text Mining Study of Essays after the Great East Japan Earthquake -

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**Abstract:** The purpose of this study was to examine the essays written by children who experienced the Great East Japan Earthquake in order to clarify the characteristics of these essays focusing on the difference between tsunami and nuclear disaster experiences. A total of 161 essays written by school-aged children were extracted for text mining analysis concentrating on their expressions of will and want for the present and future. While after the tsunami incident children mentioned the importance of conveying the crisis experience for future generations, the children experiencing the nuclear disaster expressed their want (desire) to lead a life free from restrictions such as playing outside and meeting with friends and family from whom they had been separated. Although the tsunami experience evoked children's will to remember the painful incident for the future, the children experiencing the nuclear contamination evoked their wants about their present and future life.

**Keywords:** earthquakes, tsunami, nuclear plants, text mining, time perspective

### 1. Introduction

The Great East Japan Earthquake, which occurred on March 11, 2011, was a mega-earthquake followed by large tsunami. The disaster was compounded by nuclear meltdowns at the power plants in Fukushima. This disaster caused tremendous suffering in Japan, but it also shocked the entire world and drew global attention to a variety of issues. Among them was the issue of widespread radiation leakage from the Fukushima Daiichi Nuclear Power Plant. This leakage forced many to evacuate their homes and the large population of evacuees remains a serious problem. Because the effects of radiation are long lasting, the physical and emotional trauma will remain an issue in the coming decades.

Ito & Iijima (2013) analyzed how children responded and reviewed their difficult experience through their essays, which were published within two years after the disaster to understand their resulting posttraumatic growth.

They used the following books as resources:

1) *March 11 According to Children: Never Forgetting the Great East Japan Earthquake*, by Create Media (Ed.) (2012).

2) *Tsunami: The Complete Essays by Children from the Disaster Areas*, by Ken Mori (2012: Bungeishunju).

3) *Children of the Tsunami: The Unwritten Stories*, by Ken Mori (2011: Bungeishunju).

4) *I Want to Go Home: Children of Fukushima Thinking about Life, Family, and the Future*. by The

Fukushima Children's Project for the Future, edited by Minoru Kamata (2012).

Using these publications, we proceeded to explore the difference in the essays' content according to the types of injury with regards to the tsunami and nuclear disaster.

### 2. Objectives

The purpose of this study was to examine the essays written by children who experienced the Great East Japan Earthquake in order to clarify if there were differences in the characteristics between the tsunami and nuclear disaster experiences.

### 3. Methods

#### Texts for analysis

Over 169 essays were reviewed in order to judge whether each was appropriate for inclusion in this study, which yielded: 85 from Mori (2012), four from Mori (2011) as six of the total 10 essays were already included in Mori (2012), 44 from Create Media (2012), and 36 from Kamata (2012).

In addition, in order to make comparisons among writers of the same age, the essays were classified by age at the time of writing as follows: lower elementary school students (grades 1-3), upper elementary school students (grades 4-6), junior high school students, and high school students. Their age and their descriptions of things found from their essays is the foundation for this paper.

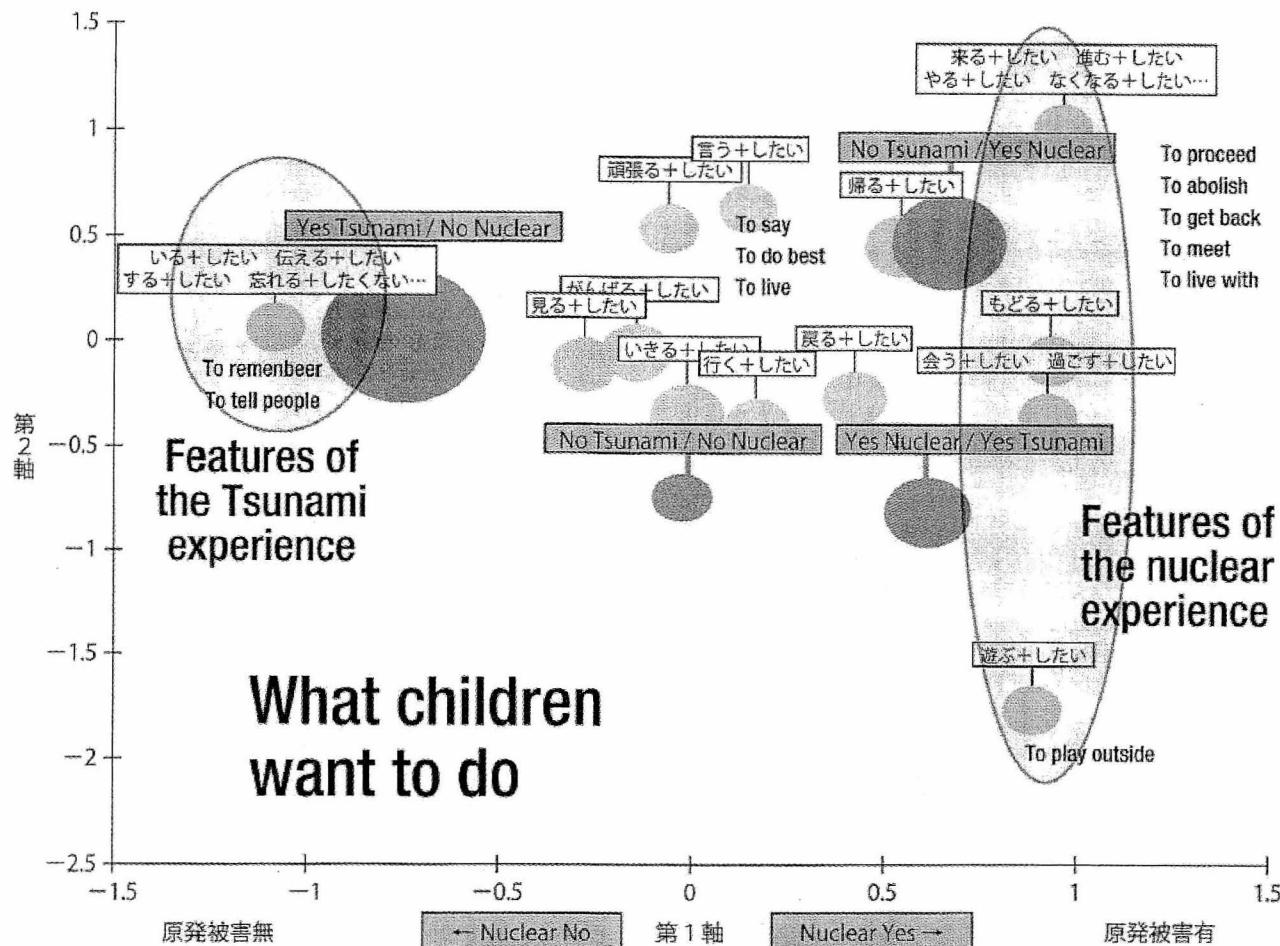


Fig. 1. Correspondence analysis of will/want expression in four groups according to tsunami and nuclear experiences

Of the 169 essays eight were excluded in total: six fell outside the scope of the study because of the writer's age (one was written by a preschooler and five were written by young people who had already graduated from high school) and two others whose authors were age 18 and who made no mention of being in school. This left 161 essays written by school-aged children for analysis.

#### Methods of analysis

The 161 essays were then turned into texts and were text mined using the text mining software *Text Mining Studio Ver.4.1* (Mathematical System Inc.). The narrative data from the essays was inputted, line by line and paragraph by paragraph, following the structure of the above mentioned publications. Analysis consisted of basic word count, word frequency, related words (word network), and correspondence analysis. This paper then

focuses on those expressions related to will and want for the present and future.

#### Ethical considerations

Because the analysis exclusively utilized the content of essays commercially available as published books in the public domain, copyright and related issues did not apply.

#### 4. Results

The following portrays the physical characteristics of the 161 essays. The average length of the essays was 601.9 characters and there were a total of 6,052 sentences. The total number of content words for all the essays analyzed was 39,415, and 6,465 words were extracted. The relatively low type-token ratio (0.164) indicated a tendency for the same words to be repeated



in the essays.

We will now consider the results of the correspondence analysis of will/want expression in four groups according to their tsunami and nuclear experiences (Fig. 1). In this diagram of correspondence analysis the frequently used words in verbal expression of will and want in each of the four groups (tsunami only, earthquake only [= neither tsunami nor nuclear], nuclear only, both tsunami and nuclear) can be seen listed near the group location. Those children who had only the tsunami experience (left side in Fig. 1) mentioned the importance of conveying the experience such as "I don't want to forget the tsunami disaster" and "I want to pass down the experience in the future." Those children who were under the influence of the nuclear disaster (right side in Fig. 1), regardless of tsunami experience, often wrote about the inconvenience and pain in their life at that time, such as "I want to go back home," "I want to see my friends," "I want my home town to recover as before," and "I want to play outside." Those who had neither tsunami nor nuclear experience (i.e., earthquake experience only: center in Fig.1) often expressed their positive willingness such as "I will not give up," "I will hold my own," and "I want to live passionately."

### 5. Discussion

The children's lives have changed dramatically after the Great East Japan Earthquake. As the tsunami disaster occurs in the interval of once in decades or even hundreds of years, the children often focused on the importance to convey the experience for reduction of casualties for the next tsunami. Their time perspective

was future-oriented based because the tsunami was now in the past. On the other hand, the experience of nuclear disaster was current and ongoing and therefore was quite different: those children often mentioned their present life as inconvenient and difficult, and about their painful feelings. The effects of the nuclear accidents were widespread not only geographically but also time consuming including the problems of housing relocation, disruption of school and workplace, food consumption, restrictions of play on the land, decontamination, money for reconstruction, etc. The nuclear accident has forcing children to endure long term distress in their daily life. Their time perspective was continuity from the disaster period, to the present time, and into the future.

### 6. Acknowledgments

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### 7. References

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