

# Seismic Culture as a Risk and Resilience Communication Device<sup>1)</sup>

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Otto von Bismarck once said, “Fools learn from experience. I prefer to learn from the experience of others.” The Prussian statesman’s quote well applies to any critical moment of decision-making in everyday life. Seismic risk involves one such critical situation. *Nankai* trough earthquakes have been repeatedly occurring once every one hundred to one hundred and fifty years (Sangawa, 2007). The return period of more than one hundred years, however, is far longer than average human longevity. It is therefore essential to keep reminding our selves of “the experiences of others” over successive generations, with regard to seismic risks. It should be noted that “the experiences” include those from both pre- and post-disaster events. Seismic culture consisting of cultural artifacts, symbols and related practices against seismic risks has become an important tool for seismic risk communication and has sustained a preparedness level among people. At the same time, it is also known that new forms of seismic culture emerge after disaster events and that they enhance the resilience among people and society. This paper aims to review the characteristics and the history of Japanese seismic culture in order to examine its values for both seismic risk and resilience communications, followed by an overview of related empirical studies in seismic risk and resilience communications and proposals for their future research directions.

## 1 Seismic culture as a sub-set of disaster subculture

Seismic culture is a sub-set of “disaster subculture” (Moore, 1964 ; Anderson, 1965 ; Wenger & Weller, 1973 ; Wenger, 1978 ; Hannigan & Kueneman, 1978). It is considered to be cultural defenses (Moore, 1964) or adaptations (Anderson, 1965), which individuals, groups and organizations develop to cope with recurrent seismic dangers. Seismic culture includes the following components related to seismic disasters : *values* (i.e., what should be prioritized), *norms* (i.e., what should and should not be done), *beliefs* (i.e., causal relations between the agent and results), *knowledge* (i.e., recognition between preceding and consequent events), *technology* (i.e., mitigation and preparedness procedures and devices) and *folklore* (success and failure narratives) (Hayashi, 1988).

Social anthropologist Isao Hayashi (2016) illustrates the case of Indonesia’s Simeulue islanders’ practice of an epic poem singing titled “Smong (*tsunami*)” as one good example of seismic culture as a form of risk communication :

Enggel mon sao curito	Please listen to this story
Inang maso semonan	one day in the past
Manoknop sao fano	a village was sinking
Uwi lah da sesewan	that what have been told

1) This paper is based on the invited presentation made for Seismic Cultures Workshop (<http://seismiccultures.org>) held at Denny Hall, University of Washington on September 18, 2017.

Unen ne alek linon	starting with earthquakes
Fesang bakat ne mali	following by giant wave
Manoknop sao hampong	whole the country was sinking
Tibo-tibo mawi	immediately
Angalinon ne mali	if the strong earthquake
uwek suruik sahuli	followed by the lowering of sea water
Maheya mihawali	please find in hurry
Fano me singa tenggi	a higher place
Ede smong kahanne	it is called “Smong”
Turiang da nenekta	a history of our ancestor
Miredem teher ere	please always remember
Pesan da navi da	the message and instruction

**Note :** The original Simeulue language poem was quoted from Hayashi (2016, p.15).  
The English translation was from Pasotti (2014).

The above poem taught the islanders the lesson to evacuate to a higher place after earthquakes and was created after the 1907 tsunami disaster that killed seventy percent of Simeulue residents at that time. Because each section consisting of four short lines in rhyme was easy to remember, almost all of the islanders were familiar with the poem. People in Simeulue have been singing “Smong” from one generation to another while they were engaged in everyday agricultural or fishery labors and in communal festivities. When the 2004 Indian Ocean mega-tsunami attacked the island, situated just sixty kilometer South-East from the epicenter, almost all of the 78,000 inhabitants followed the poem’s lesson by running to higher ground and their lives were saved except for seven people (Hayashi, 2016).

Social psychologist Haruo Hayashi (1988) classified the functions of seismic culture into three categories, *complexity reduction*, *habituation* and *solidarity maintenance*. First, it is a well-known fact that human beings go through a moment of “whiteout” or disorientation right after the onset of any disaster event (Tatsuki, 2016). Seismic culture norms and values help people quickly obtain situational definitions, leading to an immediate and appropriate course of actions, and thus reducing the complexity of the situation. Second, seismic culture is sometimes associated with a dysfunction like “the boy who cried wolf” fairy tale. Repetitive individual and organizational experiences of non-damage to warning and threats can cause the waning of shared perceptions of emergency and thus may delay appropriate actions. Third, “Danger past, God forgotten” is also a well-known fact. As time passes, a sense of community declines and seismic culture sustenance becomes harder. As Moore (1964) correctly pointed out, in his book . . . *And the Winds Blow*, that disasters function as a solidarity maintenance device and make a community of seismic culture practices.

The next sections portray how seismic culture emerged as a solidarity maintenance device for social renewal after the 1855 *Ansei Edo*, the 1923 Great *Kanto* and the 1995 *Kobe* Earthquakes. This will be followed by critical reviews of some recent empirical studies on the effects of seismic culture artifacts as a complexity reduction/anti-habituation device among the 2011 Great East Japan Earthquake (GEJE) hit local coastal communities in North Eastern Japan.

## 2 Seismic Culture as a Solidarity Maintenance Device for Social Renewal

*The 1855 Ansei Edo Earthquake and Namazu-e (Catfish prints)* : Dutch social anthropologist, Cornelis Ouwehand (1964) conducted comprehensive iconographic analyses of *Namazu-e* or catfish prints from the 1855 *Ansei Edo* earthquake period. A big boom of *namazu-e* printing was one of the most prominent social phenomena after the 1855 *Ansei Edo* earthquake (Kitahara, 1983 ; 2000). *Namazu* or the catfish was believed widely to be the causative agent of earthquakes during the *Edo* period. *Namazu-e* recorded folkloric accounts of how the *Ansei Edo* disaster was viewed and thus how its reality was constructed among common people. Like Ouwehand (1964), the social historian, Kitahara (1983 ; 2000) analyzed catfish prints and concluded that *namazu* or catfish images were portrayed in two manners, one as a messenger of Heaven-sent punishment and the other as a presage of social renewal. Although earthquakes may cause perils, they can also bring about something good (Figure 1), such as the rebalancing of inequalities by bringing wealth to laborers, carpenters, plasterers, craftsmen, lumber dealers, ironmongers, bone fracture doctors and cathouses (Figure 2).



Figure 1 : *Namazu-e* portrays perils and prosperities ([http : //www.bousaihaku.com/wopen/shake/images/cat17.jpg](http://www.bousaihaku.com/wopen/shake/images/cat17.jpg))



Figure 2 : *Namazu* working for the renewal of the society ([http : //www.bousaihaku.com/images/gallery/shake/cat19s.jpg](http://www.bousaihaku.com/images/gallery/shake/cat19s.jpg))

*Fukkou-bushi and Emergence of Volunteerism during the 1923 Great Kanto Earthquake* : The dual-faceted nature of earthquake disaster narratives is also apparent from the 1923 Great *Kanto* Earthquake archives and literature. For example, a well-established and respected entrepreneur, Eiichi Shibusawa wrote that the earthquake was not only a peril but also heaven-sent retribution for the decay of morals and ethics in politics, business and mass media in the decadent post-World War I *nouveau riche* society (Shibusawa, 1923). A sentiment of rebalancing inequalities in the post disaster utopia was commonly shared among people. A street-ballad singer-songwriter, Tomomichi (a.k.a., Satsuki) Soeda popularized *fukkou-bushi* or the recovery ballad ([http : //locatv.com/gochisosan-fukkoubushi/](http://locatv.com/gochisosan-fukkoubushi/)) :

(the first verse)

Even if we are burned, watch over us  
Edo-residents' spirit will not disappear  
Aramah! *Oyamah!*  
We savor the moon while we lay down  
In the hastily built barracks  
*Ezoezo* Imperial Capital Recovery *Ezoezo*  
:

(the fifth verse)

A high society chaperoned school girl  
Now runs a soup shop  
Aramah! *Oyamah!*  
She serves red bean soup with a shy face  
The embarrassed customer bows and receives it  
*Ezoezo* Imperial Capital Recovery *Ezoezo*

In response to the 1923 disaster, a socio-cultural movement toward solidarity also emerged as a form of volunteerism. Students from Tokyo Imperial University, for example, were among the most active volunteers. The emergence of relief volunteerism made long lasting impacts on Japanese society. After the emergency period was over, those student volunteers along with the dedicated assistance of professors, Izutaro Suehiro, Shigeto Hozumi and a Christian social reformer, Toyohiko Kagawa, shifted their attention to the root cause of the disaster and founded the Tokyo Imperial University Settlement House in a neighboring slum district of *Honjo* in 1924 (see Figures 3 and 4). The movement was modeled after contemporary social reform movements that had originated at Toynbee Hall in London and Hull House in Chicago at the end of the 19<sup>th</sup> century. The settlement house is considered to be the possible birthplace of the modern Japanese volunteerism and social reform movement (Tatsuki, 2000).



Figure 3 : Izutaro Suehiro and Toyohiko Kagawa (<http://kagawa100.blog.shinobi.jp/その他/賀川豊彦と関東大震災1>, the last accessed on February 4, 2018)



Figure 4 : Children and Volunteers at Tokyo Imperial University Settlement House Day Care Center (<https://ameblo.jp/skytree-sightseeing/entry-10855521401.html>, the last accessed on February 4, 2018)

*The 1995 Kobe Earthquake and Renaissance of Civil Society* : Phrases such as ‘the rise of solidarity’ and ‘a disaster makes a community’ were extensively used after the 1995 Kobe earthquake. The Hyogo prefectural government announced that more than about 1 million volunteers came to assist victims within two months after the earthquake and mass media agencies coined the term “Year one of volunteerism” despite the fact a similar movement was historically recorded during the 1923 Great *Kanto* earthquake as was mentioned previously. Based on the 1999 Hyogo Life Recovery Survey, Tatsuki and Hayashi (2000) confirmed the rise of community solidarity as well as self-governance in a comparison of before and after the earthquake among 993 respondents. Based on the

1999, 2001, 2003 and 2005 Life Recovery Surveys, Tatsuki (2007) concluded that a rise of community solidarity promoted a sense of normalcy among the surveyed survivors by facilitating a process of “sense making,” *i.e.*, re-evaluation/re-appraisal of ones’ own disaster experiences into positive and meaningful narratives.

The rise of solidarity triggered a new wave of thinking that connected a new solidarity-based solution of “personal troubles” with that of “public issues” by altering how people constructed the reality of the society (Tatsuki, 2000 ; Tatsuki & Hayashi, 2000). Prior to the earthquake, it was taken for granted that a statutory body would respond to public needs, and that people would concentrate almost all of their energy on private interests and profit making (see Figure 5). The earthquake literally shook up this reality. Local governments also became victims and their public serving functions were paralyzed for about three months. In this context, people learned how hard it was to survive as individuals, disconnected from other people. People then learned that they themselves, not just city officials, could respond to public needs and that people could serve public interests. The structure of the new reality about the society is illustrated in Figure 6. On the top is the statutory body. On the bottom, is the voluntary body. From right to left are public and private interests. The emergence of the statutory-voluntary and public-private interests axes properly locates the civil society sector where volunteerism, non-governmental, non-profit organization activities, and philanthropy play major roles. Public needs are responded to by the non-governmental voluntary sector in this domain. That is the people-based creation of public interests, the domain where community solidarity and self-governance play a major role. This bottom right corner had been a blind spot since the Tokyo Imperial University Settlement House was banned by the militaristic government in 1938. This was due to the enactment of the National Mobilization Law, which transformed Japan into a bureaucrat-controlled highly centralized society as illustrated in Figure 5. It took fifty years since the end of the World War II until “. . . the winds blew” (Moore, 1964) and the post-1995-earthquake movements led to the renaissance of the civic-minded solutions to public issues (Tatsuki, 2000).

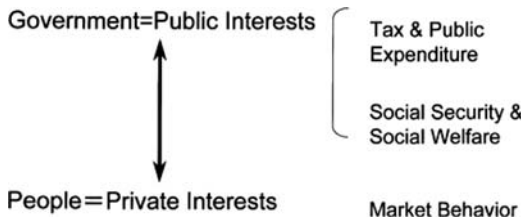


Figure 5 : The View of Public Interests Prior to the 1995 Kobe Earthquake

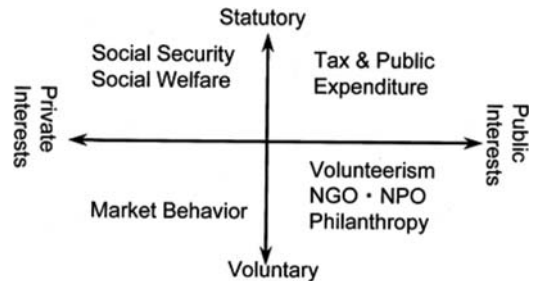


Figure 6 : Emergence of Public-Private and Statutory and Voluntary Axes

### 3 Seismic Culture as a Complexity Reduction/Anti-Habituation Device

This section reviews two other functions of seismic culture, namely complexity reduction and anti-habituation against tsunami threats. For example, tsunami memorial monuments have been systematically surveyed in recent years and it has been learned that they can be widely observed (see Figure 7) along the coastal communities from southern *Kyushu* island, *Shikoku* island, *Wakayama* peninsula, *Osaka Bay area*, *Izu* and *Boso* peninsulas, *Tohoku*, and northern *Hokkaido* regions. These historic disaster monuments are considered to be local indigenous cultural defenses against recurrent tsunami threats and have begun to be extensively studied in disaster research communities (e.g., Hayashi, 2016, 2017 ; Kawashima, 2016 ; Sato, Hirakawa, Okumura, & Imamura, 2017).

Like *Simeulue* Island folklore as was illustrated earlier, similar cultural risk communication symbols against tsunami threats have been systematically surveyed and archived in recent years by formal disaster management agencies in Japan (see Figure 7). Each balloon on the map is linked to narratives associated with a given monument. For example, local residents near Taisho bridge in Osaka’s Naniwa ward gather around their tsunami monument every *obon* season (ancestral spirit homecoming day in August) in commemoration of the 1854 *Ansei* tsunami and they trace stone engraved lessons on early evacuations using freshly inked brushes. This practice is promoted extensively by Osaka city administration (<http://www.city.osaka.lg.jp/naniwa/page/0000000848.html>). The use of a tsunami monument as an indigenous seismic risk communication tool against tsunami threats has been recently gaining wide attention by disaster scholars (e.g., Kawashima, 2016; Hayashi, 2017; Sato et al, 2017).



**Figure 7 : Tsunami Disaster Historic Monument Map** (<http://www.kasen.net/ishibumi/tsunamimap.htm>, the last accessed on February 4, 2018)



**Figure 8 : Tsunami Lesson Ink Brush Tracing at Ansei Tsunami Monument** (<https://www.facebook.com/fromosaka/videos/pcb.864778680348342/864778437015033/?type=3&theater>, last accessed on February 4, 2018)

Shosuke Sato and his colleagues at Tohoku University are one of the first groups of disaster researchers with science, engineering and social science backgrounds to have conducted empirical analyses on the impacts of tsunami monument on the effectiveness of defense against tsunami threats. Sato et al. (2017) studied 383 GEJE tsunami inundated localities in Miyagi and Iwate prefectures and examined the effects of tsunami memorials on the casualties by means of step-wise generalized linear models and found that the number of tsunami monuments had a significant negative effect ( $p < .001$ ) on the casualties (i.e., the more monuments, the fewer casualties). A personal communication with Sato (August 5, 2017), however, revealed that because the data was not obtained from a randomized trial but from observations, the analysis did not take confounding factor effects into account. This means that although the intention of the analysis was to compare the casualties between the localities with and without tsunami monuments *given* all the other conditions related to the recorded tsunami height were controlled, the sampling biases were not controlled. In other words, the Sato et al. (2017) study sample included far fewer proportions of localities without tsunami monuments where a very high tsunami was recorded or those with tsunami monuments where a very low tsunami was observed. Using the same data from Sato et al. (2017), Okumura (2015), a member of the same research group, statistically adjusted the sample imbalance through propensity score matching and reported that tsunami monument effect disappeared after the adjustment.

Acknowledging the sampling biases and the limitations in terms of the generalizability of their study results, the Tohoku University group initiated exploratory research projects on the characteristics of the GEJE hit communities where zero casualties were recorded after tsunami attacks. Sato and Imamura (2017) compared three zero casualty communities in Iwate prefecture. They found that two out of the three communities were characterized by mitigation initiatives such as relocation and building sea walls while the other community was distinguished by sustained preparedness efforts such as regular disaster drills with volunteer fire brigades leading villagers in evacuation simulations and also voluntary clean-up activities of tsunami evacuation paths. Although tsunami monuments were observed in all three communities, only two out of the three communities had regularly been involving the tsunami monument for commemoration of those who were killed in the 1896 and 1933 *Sanriku* Tsunami disasters. The tsunami monument in the third community was forgotten partly due to a relocation to higher ground after the 1933 tsunami and also due to the fact that it was buried after the 1960 Chile tsunami recovery road construction work. People in the third community living on relocation land, however, kept the norm, values and beliefs of staying away from the tsunami-inundation-expected lowland by respecting local elders' warnings over the generations.

The above report and findings may suggest that seismic cultural artifacts like tsunami monuments alone may not be influential enough and that if they are incorporated with the solidarity maintaining practices of commemoration — just like Simeulue islanders singing *Smong* while they engaged in agricultural/fishery labors as well as in communal festivities — this incorporation may act as risk and resilience communication devices for complexity reduction, habituation prevention and solidarity maintenance. At the same time, tsunami monuments are not the only effective tsunami risk/resilience communication devices since locality-based narratives may also serve to maintain the vigilance and resilience against possible tsunami threats. Obviously more empirical research is needed to come grips with the functions of tsunami monuments and narratives in the local coastal communities.

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