

**A Study of Temporal Stages and Human Senses in
Information Seeking Behaviour of the Great East Japan
Earthquake and Tsunami**

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Abstract

In information science research, information seeking behaviour (ISB) has been a popular area for the development of models and frameworks (Case, 2007). Most of ISB studies have been investigated on everyday life situations and work-related ISB that can be reasonably different from behaviour in people's disaster-related ISB (Wilson, 2000; McKenzie, 2003; Savolainen, 2008). Natural disasters can affect many people over a vast area; thus, studying disaster-related ISB is of great importance.

Furthermore, most of disaster-related ISB studies have relied on online social network data, providing insights into the ISB of those with internet access (Palen and Liu, 2007; Palen and Anderson, 2016). However, in a large-scale natural disaster such as the Great East Japan Earthquake of 2011, people in the most severely affected areas tended to have limited internet access (Gómez, 2013). Therefore, we use an alternative data source to investigate disaster-related ISB using people's testimonies that can be regarded as oral documents (Turner, 2012a, 2012b).

This thesis addresses several research objectives (RO) such as 1) to investigate the instances of disaster-related ISB such as information needs, information sources, information channels, and their relationships, 2) to analyse temporal stages of disaster on disaster-related ISB, 3) to analyse the use of human senses on disaster-related ISB, and additionally the use of human senses on demographic factors, and 4) to investigate the methods used in datasets for gaining insight into the impact of the distribution of annotations.

RO 1: To investigate disaster-related ISB instances, the first study provided a detailed description of natural disaster-related ISB of people who experienced a large-scale earthquake and tsunami, based on an analysis of people's written testimonies published by local authorities. We identified 285 disaster-related ISB instances from 118 people's testimonies collected from three reports published by local governments. The four main concepts examined included active information needs, passive information needs, information channels, and information sources. Our analyses suggest that information such as current status, disaster information, and warning represent some of the common active information needs, while warning, current status, evacuation instruction, and disaster

information are among the common passive information needs. Infrequently annotated concepts such as transportation and education-related needs are equally important in our study to understand the breadth of information needs sought during a large-scale natural disaster compared to everyday life and work-related ISB. We have also identified several categories of information channels and information sources. Our analyses suggest that most information channels were frequently used by people, with no particular category being more popular than another, as such information sources were varied. Family and neighbourhoods were far more popular information sources than other categories such as broadcast media.

Moreover, the first study also examined the relationship between the disaster-related ISB instances to gain further insight into disaster-related ISB. The main findings indicate that passive information needs were obtained by wider information channels than active information needs. Moreover, the two types of information needs (active and passive) tended to use a different set of information sources. Upon examining the relationship between information channels and information sources, most information source categories were accessed via multiple information channels, suggesting that people are not relying on a single information channels means to access information sources during disasters.

RO 2: To analyse temporal stages of disaster on disaster-related ISB, we propose further consideration of the temporal aspects of events for improved understanding of disaster-related ISB. Although previous studies suggested the importance of temporal factors (Gómez, 2013; Palen and Anderson, 2016; Palen and Liu, 2007), our study further identified the relationship between ISB concepts and temporal stages of a disaster. Our analyses suggest that concepts such as information needs (both active and passive) and information channels can exhibit different patterns across the temporal stages, while information sources remained relatively consistent.

RO 3: To analyse the use of human senses on disaster-related ISB, and additionally the use of human senses on demographic factors, derived from the dataset used in RO 1-2, people's testimonies that often mentioned about the use of human senses to obtain and to receive information observed human senses can play a significant role. We identified three out of five human senses, such as sight, hearing, and touch from 1,791 sense-bearing sentences of

259 people's testimonies in the disaster-related ISB context. Our findings suggest that the use of senses was varied across passive and active information needs, for example, the sense of hearing frequently appeared in passive information needs, and the sense of sight frequently appeared on active information needs. Our findings also suggest that sight appeared on the majority proportion of senses to obtained information via unspecified information sources and information channels. In information sources and information channels, obtaining information sources from family, neighbourhood, work community, colleague, or public sectors via information channels such as face to face communication, phone, or speakers was frequently observed.

Further, the proportion of hearing was often higher than sight in many categories of information sources and information channels. As for the unspecified categories, we speculate that the high proportion of sight is due to the cases where the person itself obtained information, but further study is needed to validate this. Additionally, our results show that the use of senses was significantly varied across demographic factors such as gender, location, and age groups in the context of disaster-related ISB.

RO 4: To investigate the methods used in datasets for gaining insight into the impact of the distribution of annotations, the third study examined the impact of two datasets used in RO 1-2 and RO 3 by qualitatively comparing the distribution pattern. Our analysis suggests the proportion of active and passive information needs, and the most frequent category in active information needs, information sources, and information channels. On the other hand, the category distribution of passive information needs showed more variance than other variables. Our analysis also suggests that there are several common patterns of annotated data from the two testimony datasets that were produced in a different context.

This thesis contribution offers people's written testimonies as a type of oral documents can be exploited as a useful source of studying disaster-related ISB (Turner, 2010). Our approach facilitates the study of disaster-related ISB of people without internet access both during and after a disaster. Thus, we propose the temporal stages of disaster and the human senses as the novelty factors on disaster-related ISB (Powell, 1954; Dynes, 1970; Cox et al., 2017).

Key words: *Disaster-related Information Seeking Behaviour, Temporal Stages, Human Senses*

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*To Allah,
Ummi and Papa*

CHAPTER 1

Introduction

1.1 Background

Natural disasters can affect the lives of vast numbers of people, and loss of infrastructure, for example, the 2011 Great East Japan earthquake and tsunami (Thatcher et al., 2015). Due to those casualties, we need to reduce and mitigate the damage. Some of the biggest challenges in disaster management, however, are the lack of insight about people's behaviour especially their communication and information dissemination in affected areas (Palen and Liu, 2007; Arai, 2013). Further, we first need to have a detailed understanding of human-information behaviour during a natural disaster, which in this study, we called disaster-related information seeking behaviour (ISB). Moreover, since a natural disaster represents a temporally acute, often unanticipated event (Imran et al., 2013), people's disaster-related ISB can reasonably be expected to differ from behaviour in everyday life and work-related situations (Wilson, 2000; McKenzie, 2003; Savolainen, 2008). Also, protecting one's health and safety is the primary concern during natural disasters, which is not necessarily the case for traditional ISB studies.

Studying disaster-related ISB poses many challenges. First, since natural disasters are unanticipated and unpredictable events, formulating an exact study plan is challenging. Second, given that a vast area with diverse geographical conditions can be affected by a large-scale natural disaster, data collection and sampling are also challenging. Third, a natural disaster can destroy critical infrastructure, resulting in the loss of telecommunication tools such as phones and the internet. This means that analysing online data, a common data source (e.g., Palen and Liu, 2007; American Red Cross, 2011; Tapia et al., 2011), may not provide a comprehensive view of disaster-related ISB. Fourth, although governments and relevant parties release social data on disaster-related events, detailed accounts of local people's behaviour are often not adequately recorded and documented. These combined challenges often are obstacles to studying disaster-related ISB models. Furthermore, it is plausible that disaster-related ISB is significantly affected by other factors, including disaster type (e.g., flood, typhoon, earthquake, and tsunami), scale, and geographic location.

A better understanding of disaster-related ISB is expected for the society that needs further development of building resilient community by exchanging valuable information that can be efficiently captured, summarised, and delivered to relevant parties in the community.

1.2 Problem statement, justification and novelty of the research

In information science research, ISB has been one of the richest for the creation of models and frameworks. The ISB study orientations are mostly system orientation and user orientation on everyday life and work-related situation (Wilson, 2000; Case, 2007; Savolainen, 2008). System-oriented studies, for example, focused on developing information systems; and user-oriented studies focused on people as an information seeker. In this thesis, we focus on people or user orientation as an information seeker on the disaster-related situation that notably different from everyday life or work-related situation.

In a disaster situation, people search for information about their family, which indicated the different information needs compared to when people do routine work. People's information needs will also affect the kind of information sources and channels they use, for example, in a disaster situation, the internet or telecommunication will be cut off; thus, the major disaster-related ISB concepts will be different from everyday life or work-related ISB. Also, demographic characteristics, occupation, and social role are some of the particular interest in emerging literature within ISB context.

In this thesis, we look into two factors, such as temporal stages of disaster and human senses. Temporal stages of a disaster were chosen because people's behaviour is changing over time, and thus, temporal stages are significant to study. Another factor is the human senses because a person will enforce their senses to work in a disaster situation, and thus this thesis will provide an insight that human senses can play a significant role in describing disaster-related ISB.

Therefore, this thesis aims to study a detailed account of disaster-related ISB on the 2011 Great East Japan Earthquake and Tsunami. This thesis also aims to investigate two factors that have been disregard in ISB studies, such as temporal stages of a disaster and human senses might be useful to identify disaster-related ISB.

To study disaster-related ISB, we collect oral documents that consist of people's written testimonies that will allow us to gain insight into disaster-related ISB of people who did not have access to the Internet during and after the disaster, and who were not represented in online social media data (Palen and Liu, 2007; American Red Cross, 2011; Tapia et al., 2011). Published people's testimonies also allow other researchers to revisit the original texts for further analysis or verification, and to increase the level of reproducibility in our work. Although user-generated contents in social media can also offer an opportunity of re-examination, the availability of online contents can be unpredictable due to technical problems in Internet connection, content management system, or web service provider. Also, authors can remove their contents at any time. Furthermore, the recent strong trend of social media-oriented studies (Palen and Liu, 2007; Tapia et al., 2011) can potentially lead to a skewed understanding of disaster-related behaviours. By expanding the scope of studies to non-social media sources, we have an opportunity to develop a more balanced understanding of disaster-related ISB in related domains. Further, as Thatcher et al. (2015) argue, oral documents provide coverage over a large area of severely affected regions to include a broad representation of the different people's perspectives and experiences expressed in their languages and belief, rather than led by researchers' agendas (Frohmann, 2004).

1.3 Research objectives

In terms of theoretical contribution in ISB models, this thesis aims to provide a detailed account of people's ISB during the 2011 Great East Japan Earthquake and Tsunami that will allow us to gain a better understanding of disaster-related ISB concepts such as (passive and active) information needs, information sources, and information channels, and their relationships.

Further, two potential factors were proposed to explain disaster-related ISB, such as temporal stages of a disaster, and human senses. By investigating those factors, more detail difference of disaster-related ISB will be provided comparing with typical behaviour described in everyday life or work-related situations.

Additionally, as for methodological contribution, we compare multiple collections that were collected from two different studies to identify common disaster-related ISB patterns.

1.4 Thesis outline

This thesis is organised as follows:

Chapter 2 introduces the basic concepts of crisis and disaster, reviews studies related to information behaviour, including ISB in natural disasters, and disaster information behaviour study in Japan. Temporal stages of a disaster, human senses on ISB and demographic studies, and oral documents are discussed.

Chapter 3 presents the first study which aims to study the instances of disaster-related ISB such as information needs, information sources, and information channels and their relationships, and to study the relationship between temporal stages of disaster and disaster-related ISB.

Chapter 4 presents the second study which aims to investigate the use of sight, hearing and touch interplay with disaster-related ISB, and the use of senses in disaster-related ISB affected by age, gender, and location.

Chapter 5 presents datasets comparison to identify common patterns based on disaster-related ISB instances.

Finally, Chapter 6 concludes the thesis by highlighting the major findings of the present work. The potential directions for future work are also discussed.

CHAPTER 2

Literature Review

2.1 Definitions of crisis and disaster

The term “crisis” is typically used as a catch-all concept encompassing all types of “un-ness” events (Hewitt, 1983), situations that are unwanted, unexpected, unprecedented, and almost unmanageable, which cause widespread disbelief and uncertainty (Stern and Sundelius, 2002). A crisis is more precisely defined as “a serious threat to the basic structure or the fundamental values and norms of a social system, which under time pressure and highly uncertain circumstances necessitates making critical decisions” (Rosenthal, 1989, p. 10). The world has faced multiple types of crises, for example, human-made crises such as terrorist attacks (9/11, Virginia Tech massacre), the spread of human and animal viral disease (H1N1), nuclear and chemical crises (Chernobyl), war and much more (Hagar, 2010).

Table 2.1 Disaster categories and sub-categories (Oltanu et al., 2015)

Category	Subcategory	Examples
Natural	• Meteorological	• Tornado, hurricane
	• Hydrological	• Flood, landslide
	• Geophysical	• Earthquake, volcano
	• Climatological	• Wildfire, heat/cold wave
	• Biological	• Epidemic, infestation
Anthropogenic (Human-Induced)	• Sociological (intentional)	• Shooting, bombing
	• Technological (accidental)	• Derailment, building collapse

However, not all crises are disasters: “a crisis is an unstable situation” that may or may not lead to a disaster (Castillo, 2016). A related yet conceptually distinct term ‘disaster,’ on the other hand, has a stronger nuance of its impact on a community or society. National Science and Technology Council (2005, p. 21) defined a disaster as a “serious disruption of the functioning of a community or a society causing widespread human, material, economic or

environmental losses which exceed the ability of the affected community or society to cope using its resources.”

Disasters have many characteristics and types. Table 2.1 shows two disaster taxonomies used in Europe and the United States (Olteanu et al., 2015). These categorisations are important because the type of disaster affects people and are expressed differently. Therefore, in this thesis, we focus on natural disasters to the extent to which it disrupts social routines or social order.

2.2 Information behaviour models

In information science research, information behaviour has been a very popular area, and one of the richest for the creation of models and frameworks to explain the complex data produced (Case, 2007). Figure 2.1 shows Wilson (2000)’s nested model of information behaviour conceptual areas. Wilson (2000) defines models of information behaviour to be “statements, often in the form of diagrams, that attempt to describe an information-seeking activity, the causes and consequences of that activity, or the relationships among stages in information-seeking behaviour.”

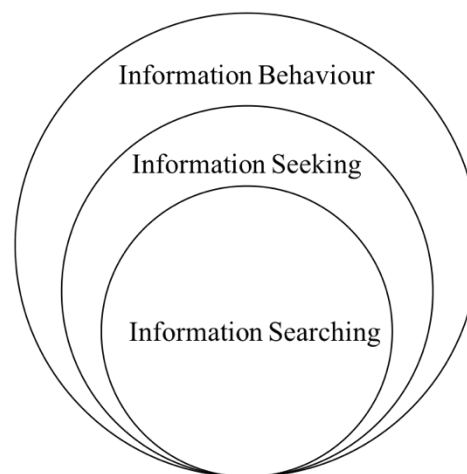


Figure 2.1 The nested model of information behaviour (Wilson, 2000)

Furthermore, ISB forms part of the broader field of information behaviour, which includes both intentional information seeking, such as querying or actively browsing for information, and unintentional behaviours, such as passively watching a television commercial (Wilson, 2000). ISB typically assumes a model of the search process including the initial recognition and specification of an information need that may be expressed explicitly or implicitly (Case, 2007; Marchionini and White, 2007).

Information need, however, has no accepted definition, though there have been numerous suggestions (Case, 2007). Dervin (1983) suggests that a need is a state that arises within a person, suggesting some kind of gap that requires filling; and when applied to the word information, as in information need, what is suggested is a gap that can be filled by something that the needing person calls “information”. To fulfil information needs, people need to search through information channels and information sources. Rogers (1995) defined information channel as a means by which information is moved from one point to another, usually from the information source to the receiver such as face-to-face, radio, or the internet. Further, information source is defined as a medium in which knowledge or information is stored or the originator of a message, for instance, an agency representative, or a friend (Rogers, 1995).

Often the case, ISB studies have been identified from people’s everyday life and work-related behaviour (Wilson, 2000; Case, 2007; Marchionini and White, 2007; Savolainen, 2008). In this thesis, we focus on natural disaster-related ISB, which have been looked on a limited number of studies (Ryan, 2013, 2016). The ISB instances such as information needs, information sources, and information channels will be the key and relevant to this thesis as the ISB model was based on attempted to explain how people seek information during disasters.

2.2.1 Information seeking behaviour in natural disasters

Over the past few decades, studies in the area of ISB have advanced, moving beyond a resource-focused to a person-centric perspective (Clemens and Cushing, 2010). Numerous models have been developed to describe and explain complex relationships between a person’s perceived information needs, cultural and situational contexts, information resources, systems, and intermediaries (Ingwersen and Jarvelin, 2006). Researchers have

also studied how people seek information in disaster situations, focusing on the media sources people used during disaster situations (e.g., Piotrowski and Armstrong, 1998; Greenberg et al., 2002; Roeser and Schaefer, 2002; Seeger et al., 2002; Stempel and Hargrove, 2002). This line of inquiry can provide insights that help emergency agencies develop better communication plans.

According to Ryan (2013), anthropogenic (human-induced) disaster, such as the 2001 World Trade Centre (WTC) attacks in the United States, were a major catalyst for increasing the number of studies in disaster-related ISB, transforming research from focusing on media or web usage to information networks as a whole (e.g., Spence et al., 2006; Cohen et al., 2007; Palen and Liu, 2007; Lachlan et al., 2008; Hagar, 2010). For example, Spence, et al. (2006) investigated the effects of gender and age on disaster-related ISB, from the perspective of uncertainty reduction. His findings suggest that females regarded television and radio as more useful than males, while males were more likely to use the internet in the aftermath of the 2001 WTC. Lachlan et al. (2008) investigated media use during the I-35W Mississippi River bridge collapse in 2007 and determined that young people were more likely to use social media such as Twitter. People in urban areas were more likely to use television, particularly females. Females are also more likely to use the internet for messages related to affective needs.

Cohen et al. (2007) studied Grampians Fires in Australia and highlighted the usefulness of local radio stations for distributing valuable information to the community. The study also investigated different types of warning information, which is an essential type of information needs in disaster-related ISB. Palen and Liu (2007) studied the role of information and communication technologies (ICT) in the context of two different disaster cases, the 2005 Hurricane Katrina and the 2001 WTC. Their work drew on disaster sociology using spatial disaster zones and temporal phases to describe emerging information pathways. Spatial disaster zones describe geographic sizes of impact, while temporal stages consist of eight socio-temporal stages of disaster proposed by Powell (1954) and Dynes (1970). Their results suggest that information pathways are altered after the impact stages of disaster because ICT becomes useful only during the post-impact phases such as inventory, rescue, remedy and recovery. Hagar (2010) investigated foot and mouth disease outbreaks in Northwest England and determined that people in regional areas serviced by small rural towns tended to use

personal agency contacts when possible and were more likely to use family, friends, and knowledgeable acquaintances. The concept of information horizons (Sonnenwald, 1999; Savolainen, 2008) was also examined to model disaster-related ISB. For example, Ryan (2013, 2016) adapted Savolainen (2008)'s information source horizon concept to better understand ISB during slow-moving flood and flash flood incidents in Queensland, Australia. She determined that people in cities tended to discover disasters occurring in their community through interpersonal contacts via a variety of methods including mobile and fixed phones and face-to-face interaction.

To summarise, the literature has identified factors such as location, gender, age, disaster types, media types, ICTs, and community relationships as factors potentially affecting disaster-related ISB. However, the previous studies did not look into a detailed description of disaster-related ISB, such as information needs, information channels, information sources, and its relationship among concepts (Spence et al., 2006; Ryan, 2013, 2016). Because the previous studies also have not looked into temporal aspects of events, and the relationship with ISB concepts on the 2011 Great East Japan Earthquake and Tsunami, this thesis aim to provide a thorough description of disaster-related ISB concepts and the relationship between information needs, information channels, and information sources of disaster-related ISB. This thesis also aims to suggest more consideration of the temporal stages of a disaster, and the human senses for enhanced understanding of disaster-related ISB.

2.2.2 Disaster information behaviour study in Japan

Japan is one of the countries most affected by natural disasters. Regarding to disaster information behaviour study in Japan, studies have been conducted to understand human factors during the 2011 Great East Japan Earthquake and Tsunami. Gómez (2013) carried out a study on the reaction of international students at Tohoku University during the 2011 Great East Japan Earthquake. This study indicated that students relied primarily on secondary sources of information to make decisions, for example, family and friends of the same nationality, most of whom were not likely to be better informed than the students themselves. Six different stages in the evolution of the emergency such as (1) immediate response; (2) taking shelter in Sendai; (3) life in the city during the aftermath; (4) sheltering outside Sendai; (5) coming back; plus (6) an overview of the experience, were used. The

study suggests that helping students assimilate more into Japanese society might enhance their decision making during a crisis. The survey suggests deeper links with Japanese society influence behaviour after a disaster, which can positively influence future reactions during the extended phase of a similar emergency. This statement is also supported by Arai (2013)'s study on Japan's tsunami warnings and evacuation instructions from a linguistic perspective, which states that once a disaster happens, the only way to evacuate people is through language.

To examine the role of information behaviour on information failure, Thatcher et al. (2015) analysed four reports about the Fukushima Nuclear Power Disaster. The Fukushima Nuclear Power Disaster is the subsequent disaster of 2011 Great East Japan Earthquake and Tsunami whereas the extremely-dangers of radiation-contaminated water from the disaster has remained dormant. Based on the analyses, the authors concluded that information avoidance behaviour was a major factor of the disaster and that the behaviour can be explained by a combination of three theories: Affective Load Theory, Face Threat Theory, and Escalation Theory. The central concept behind the incident was the "myth of nuclear safety" which was introduced in the 60s and developed to be 'learned affective norms' in the community (Affective Load Theory). This discouraged people to find information that might challenge the safety myth. Similarly, this discouraged people to state a message that doubted the safety of nuclear since they could lose face (Face Threat Theory). When such a culture was maintained for over 40 years, both behaviours were escalated and became difficult to change, even when the situation was so critical (Escalation Theory).

Thatcher et al. (2015)'s study is particularly important to the context of this thesis. First, their study investigated information behaviour in the context of a complicated large-scale earthquake and tsunami involving a nuclear power explosion when failure to use information effectively resulted in wide-ranging disasters. Second, their research demonstrated that written texts published by the nuclear plant company and authorities could be a useful resource to facilitate our understanding of disaster-related ISB. The methodology adapted in this thesis using report and publications from local authorities exhibits similar strengths and weaknesses as those of Thatcher et al. (2015)'s study. The main difference is that this thesis focuses on the understanding of local people as opposed to cooperative organisations.

2.3 Temporal stages of disaster

During theoretical development on disaster research, Neal (1997) summarised various phases of disaster as a critical component often embedded implicitly in the meaning of disaster. Time and space models are important methodological tools for organising, describing, and explaining data since differences in disaster phases and area coverage represent various types of individual and group behaviours (Stoddard, 1968; Neal, 1997). One of the early attempts to classify periods of the disaster was represented by Powell's work (Neal, 1997). Following Powell (1954) study, Dynes (1970)'s review of organisational behaviour at both the theoretical and practical levels in a disaster context by drawing heavily upon Powell's eight different disaster-time stages (Britton, 1988). Dynes (1970) grouped Powell's stages into three conditions, such as pre-disaster conditions, emergency states (i.e., warning, threat, impact, inventory, rescue, and remedy), and post-emergency period (i.e., recovery). Dynes (1970) argued that disasters follow a general temporal sequence despite the nature of the disaster. Thus, Dynes (1970) also employed these phases to successfully argue for an all disaster types.

In this work, to compare some stages models, we use the most established model for temporal stages of disaster, proposed by Powell (1954). Table 2.2 presents Powell's eight temporal stages, ranging from a pre-disaster stage to a recovery stage. Although the stages are designed to depict a general transition from Stage 0 to 7, it is possible that one's state reverts to a previous stage when multiple events are occurring in a short time of period (e.g., earthquake, aftershock, tsunami, and fire). This thesis is not the first to recognise the importance of temporal stages in ISB studies. For example, Gómez (2013) divides six stages in the evolution of an emergency in the context of international students in Tohoku University during the 2011 Great East Japan Earthquake. His stages consist of immediate response, taking shelter in Sendai (the largest city in the Tohoku region, Japan), life in Sendai during the aftermath, sheltering outside Sendai, back to Sendai, and an overview of the experience.

As can be seen, Powell's model and Gómez's model are different in the scope. Gómez's emergency stages were designed to describe a particular location and situation during the disaster. Another example, Palen and Liu (2007) used the spatial and Powell (1954) temporal ordering of disaster events to frame a broader set of immediate changes arising from

pervasive information and communications technology discussion. Finally, a user study by Joho, et al. (2015) suggests that temporal aspects of information needs can strongly influence the behaviour of information searching. These findings reinforce our aims to investigate the aforementioned temporal stages on disaster-related ISB in detail.

Table 2.2 Eight socio-temporal stages of disaster (Powell (1954) cited by Dynes (1970))

Stage 0: PRE-DISASTER
State of social system preceding point of impact
Stage 1: WARNING
Precautionary activity includes consultation with members of own social network
Stage 2: THREAT
Perception of change of conditions that prompts survival action
Stage 3: IMPACT
Stage of “holding on” where recognition shifts from individual to community affect and involvement
Stage 4: INVENTORY
Individual takes stock and begins to move into a collective inventory of what happened
Stage 5: RESCUE
Spontaneous, local, unorganized extrication and first aid; some preventive measures
Stage 6: REMEDY
Organized and professional relief arrives; medical care, preventive and security measures present
Stage 7: RECOVERY
Individual rehabilitation and readjustment; community restoration of property; organizational preventive measures against recurrence; community evaluation

We are not the first to recognize the importance of temporal stages in ISB studies. For example, Palen and Liu (2007) used the spatial and temporal ordering of disaster events to help frame a larger set of immediate changes arising from pervasive information and communications technology diffusion. Recent work by Joho et al. (2015) also suggests that temporal aspects of information needs can strongly affect the behaviour of information searching. These findings reinforce our aims to investigate the effect of temporal stages on disaster-related ISB in detail.

2.4 Human senses on information seeking behaviour

The role of the body is an “absent presence” in social science (Shilling, 2012). There is a wide consensus that we cannot understand human cognition without considering how humans interact with the world through their senses and do their thinking within a body.

In information science, the observation of bodies in action was first reported within an information literacy (IL) perspective to theorise the “corporeal modality” of information on the information experiences of 16 ambulance officers in training and on-road practice (Lloyd, 2009). Corporeal information can be understood as “information that is experienced through the situated and sensory body as it interacts with material objects, artefacts and other people inhabit the same landscape” (Lloyd, 2009). Lloyd has explained that experienced officers collect information through their sense of touch (haptic). As a result, Lloyd suggests that the body becomes the location for the intersection between conceptual information and information drawn from real life through practice.

Apart from corporeal information, another terminology is used to explain ‘the body’: embodied information (Cox et al., 2017). Embodied information “describes the corporeal expression or manifestation of information that has symbolic, linguistic, and/or signal-based patterns of an organisation” (Bates, 2006). The study is based on fieldwork conducted at The Iron Age Broch of Gurness and the Neolithic Ness of Brodgar excavations in Orkney, Scotland in 2013 and 2014 on embodied information examined the information practice study of archaeologists, students and volunteers undertaking a field excavation (Olsson and Llyod, 2017). Their findings indicate that the sense of touch (haptic) is only one example of embodied practices. Archaeology students and volunteers working at the sites needed to acquire such skills as lifting heavy stones or moving the dirt to the spoil heap, which are physically demanding. Nevertheless, most of the previous study analysis had described only one sense within their study domain.

Recent work in information behaviour recognises the importance of embodied information particularly in serious leisure activities, including hobbies such as running, music, and liberal arts (Cox et al., 2017). Their findings suggest that embodied information is central to the hobby of running, both through the diverse sensory information that the runner uses and through the dissemination of information. Similarly, studies on the effect of music, drawing

and the liberal arts on the embodied experience suggest that the role of the body is a key part of information behaviour. Due to the absence of reference to the body in some influential works on information behaviours, Cox et al. have suggested that more empirical and theoretical work is needed to understand insights from practice theory, phenomenology, embodied cognition and sensory studies (Cox et al., 2017).

Despite the terms that some works have offered, research on the senses is a growing field, and a significant amount of research remains to be conducted (Robinson, 2015; Singh et al., 2017). Therefore, to expound upon the role of the body on the context of disaster-related ISB, we use the (five) human senses.

2.4.1 Human senses on demographic studies

Demographic studies allow us to study changes to the human population through a phenomenon defined by various criteria such as age, gender, and location (Howes, 2018). Research on the demographics' effect on the senses has examined the use of the senses in spontaneous conversation across a range of languages and cultures (San Roque et al., 2015). The findings suggest that sight is always the dominant sense, with hearing ranked second in shaping conversation of the language.

The effect of gender and age on the senses has also been studied in the context of human-vehicle interaction (Riener, 2018). Three senses modalities, such as sight, hearing, and touch, have been used to study reaction times on age- and gender-dependent evaluations and the results suggest that the reaction times for the different modalities sight, hearing, and touch can be different across gender and age groups. Psychology research on episodic memory further stated that the use of senses is known to decrease with age and different sensitivity of using the senses across gender, for example the sight ability seems to decrease as the age increases (Nyberg et al., 1996).

Another demographic characteristic to consider is the location. Location is essential to finding our way in spatial environments (Towey, 1999; and Jenkins et al., 2016). Although the concept of place remains elusive, deriving and quantifying such meaning allows us to observe how people transform a location into a place and shape its characteristics (Towey, 1999). Therefore, to understand the use of the senses across demographic characteristics

within the context of disaster-related ISB, we additionally investigate the effect of senses on age, gender, and location.

2.5 Oral documents

Oral documents used in our analyses included testimonies of people who were affected by the 2011 Great East Japan Earthquake and Tsunami. These testimonies were recorded, transcribed, edited, and published independently through various outlets. Although we did not have control over the interviewing protocols and transcription details, collecting testimonies from multiple published books and reports gave us access to a relatively large number of local stories spread over a wide area, which would be otherwise very costly to achieve (e.g., by manual interviewing). Also, it ensures the reproducibility of findings since the original sources are publicly available (Turner, 2012a).

Turner (2012a) defined oral documents as “evidence or information about both specific content and characteristics embedded in action(s) essential to furnishing that content via word of mouth spoken in the presence of another”. Further, oral documents can refer to a broad range of resources. For example, oral documents are gathered only from an oral delivery mechanism that the results may someday help increase understanding of transmitting oral information. The broader scope of oral documents is needed that may include instant messaging, Internet-based calling, teleconferencing, voice mail, Twitter, and other modes used to transmit information that has characteristics of orality that has been neglected from document studies (Turner, 2012a, 2012b). Further, orally based information, along with certain types of related electronic and written information, is typically categorised as one of two types: informal information or information from informal sources (Turner, 2012a). However, these documents provide researchers with multiple ways to reflect upon everyday life have been useful for the investigation of ISB (Quarantelli, 1987, 1997; Plummer, 2001; Taylor et al., 2009; Fu et al., 2010; Charmaz, 2014).

Turner (2010b) suggests that oral documents provide insight that assists in understanding how orally based information intersects with information behaviour, knowledge management, information policy, cultural heritage, and professional development that involves orality. As Frohmann (2004) explains, an information artefact, specifically a

document, can be informative. He articulates four properties such as materiality, institutionalisation, social discipline, and historicity that reflect how documents result from decisions, in the form of social agreements, that render them informative. The rectification of oral documents broadens the scope of information science and implies a need to understand them better so practitioners can carry out their professional responsibilities to collect, describe, organise, and preserve oral histories (Turner, 2012b). These points demonstrate the usefulness of research using orally based information.

Moreover, research beyond those characteristics is also needed to address orality situated in different types of social contexts that may incorporate a larger sample. Oral documents also should determine whether and how a range of actions that orality can involve (including gestures, blinking, hand movements, audience response, and more) contribute to information conveyed orally while face-to-face (Turner, 2012a, 2012b).

Therefore, in this thesis, we focus on oral documents as our primary sources.

2.5.1 Possibilities and future of oral history in Japan

In worldwide, there is high possibility and advantages of another oral history, besides written testimonies that also can be called oral documents, using video recordings of testimonies for interviews, transcriptions, and duplication (Turner, 2012a). In Japan, on the contrary, oral history is an undeveloped discipline, used under various labels, mainly by academics who are often trained overseas or writers who have found interviews effective in collecting personal stories without clear-cut methodological guidelines (Yamamoto, 2000).

Oral history is called *kojutsushi* or *kikigaki* in Japanese. Although sometimes called *oraru hisutori*, the English expression is not widely accepted. *Kojutsushi* or *kikigaki* includes not only taped interviews but also “dictated” stories where an interviewer wrote down what the narrator told him. As such, this approach to history is said to date back to the eighth-century. However, modern oral history, as an active approach to history and education, is little studied or understood. In 1996, a sociologist, Tani Tomio, defined *kojutsushi* as a narrated personal history in the form of an interview, which needed to be tape-recorded, transcribed, edited, and polished to become a “life history.”

The first attempt to examine oral history systematically as a historical approach took place in 1987 when the Historical Science Society of Japan (*Rekishi Kenkyu Kai*) featured oral history in its *Rekishigaku kenkyu* (Journal of Historical Studies). Aware of the lack of an academic evaluation of the oral history approach, the journal discussed the possibility of common ground among those who used oral interviews for their research and writing. The first part was based on a symposium-reports and discussion by scholars, concerning oral history in England, and the second part, ironically, was scholars' interviews with a non-fiction writer, Sawachi Hisae, and a "reportage" writer, Honda Katsuichi.

The first work clearly called "oral history" came out from the Japan Library Association (*Nippon Toshokan Kyokai*). A group of its members organized a task force, *Oraru Hisutori Kenkyukai* (oral history study group), to record the history of public libraries in the middle-to small-size cities. Published in 1998, *Chusho toshi ni okeru kokyo toshokan no unei* is a product of such oral history interviews. Although the interview method and format are more like dialogues, the book is significant in that it was planned and done as an oral history project to record the detailed history of some libraries through spoken narratives alone. This group is still in existence, with a plan to conduct further interviews. If we include non-fiction stories such as historical reportage during and after a disaster and analytical life histories, it can be said that there have been a fair number of works in oral history in Japan, although few of them call themselves "oral history."

CHAPTER 3

An Analysis of Natural Disaster-Related Information-Seeking Behaviour Using Temporal Stages

3.1 Aim and objectives

A few numbers of ISB studies have been looking into disaster-related events, and this thesis aims to provide a detailed account of people's ISB during the 2011 Great East Japan Earthquake and Tsunami. This will allow us to gain an understanding of disaster-related ISB, and there are main ISB concepts such as (passive and active) information needs, information sources, and information channels; and their relationship among disaster-related ISB concepts.

This thesis also investigates temporal stages of disaster on the context of disaster-related ISB. By examining temporal stages of a disaster, more detail difference of disaster-related ISB will be provided comparing with typical behaviour described in everyday life or work-related situations. Following are research questions,

- What are the instances of (passive and active) information needs, information sources, and information channels of disaster-related ISB, and their relationships?
- How do the temporal stages of disaster affect disaster-related ISB?

3.2 Methodology

We employed content analysis to make replicable and valid disaster-related ISB instances by systematically interpreting and coding people's testimonies (Morgan, 1993; Hsieh and Shannon, 2005; Krippendorff, 2005). Our work began by establishing a collection of oral documents that consists of local people's testimonies from the 2011 Great East Japan Earthquake and Tsunami that were published approximately a year after the event, which provided them sufficient time to reflect on the event while maintaining the memory of their

experiences. People's testimonies are gathered from an oral delivery mechanism that the results may help increase understanding of transmitting oral information; and thus, people's testimonies used in this study can be regarded as oral documents (Turner, 2012a, 2012b). People's testimonies used in this study includes a memo or written texts similar to a diary, or in Japanese called *Shuki*.

We set the criteria for data collection as follows. First, we selected books and reports containing a large number of testimonies published by local authorities to ensure the inclusion of perspectives from a diverse population of the disaster event, while minimising variance in the testimony collection process. The collection used in this study represents one of the largest collections of testimonies identified at the time of data collection.

Second, we focused on two of the most severely affected areas, Ibaraki Prefecture and Fukushima Prefecture, to ensure the capture of prominent impacts of the event on people's ISB in the analysis. For example, the Ibaraki area experienced one of the largest earthquakes, followed by tsunami, aftershocks, and blackouts. Fukushima Prefecture further experienced nuclear power plant accidents. In this thesis, earthquake, tsunami, and nuclear explosion were happening almost simultaneously, and thus, we do not try to isolate each type of disasters in the analysis. Rather, we try to capture and understand the complexity of disaster-related ISB by maintaining the occurrence of multiple disaster types.

3.2.1 Collection of testimonies

Table 3.1 summarises the testimony collections included in this study. Pages refer to the page numbers from testimonies in respective reports. The first and second reports are based on interviews with local people and professionals involved in the disaster, while the third report has interviews with representatives of organisations in various sectors such as schools, hospitals, fire stations, and local business. In all, 4,756 sentences from 143 individuals were identified from the three collections. Of those, after coding, 118 had at least one instance of ISB that was analysed in this study on Table 3.1. Table 3.2 shows age and gender distribution of testimonies.

We used Erikson's lifespan stages psychosocial development theory to divide the age categories into adolescence (13-19), early adulthood (20-39), adulthood (40-64) and

maturity (65>) (Erikson, 1950, 1968), since this is one of the most well-known categorisation of ages in social studies. The age distribution of testimonies was not available in nearly half of the testimonies. For those testimonies with age information, the majority were on adulthood (40-64) category. For gender distribution, it is evident that more male data exists than female data.

Table 3.1 A summary of the testimony collections ($N = 118$)

ID	Document title	Prefecture	Pages	Publication Date	Testimonies
1	Kita Ibaraki Shinsaiki (North Ibaraki's Record)	Ibaraki	Page 12-171	February, 2012	59
2	2011-nen 3-gatsu 11-nichi Iwaki: Tsutae tsugitai Higashi Nihon Daishinsai no Kiroku (2011/3/11 - Iwaki City: The Great East Japan Earthquake Record)	Fukushima	Page 17-88	March, 2012	50
3	2011-3-11 Iwaki-shi, Higashinohon daishinsai no Shougen to Kiroku (2011/3/11 Iwaki City: Record of Testimony on The Great East Japan Earthquake)	Fukushima	Page 30-31, 36-37, 54-55, 60-79, 80-83, 86-89, 92-93, 112-113, 146-147, and 226-227	March, 2013	9

Table 3.2 Age, and gender group of testimonies ($N = 118$)

Age	Gender
Adolescence (13-19)	2 Female 45
Early adulthood (20-39)	6 Male 73
Adulthood (40-64)	33
Maturity (65>)	10
Not available	67

3.2.2 Coding methods

The next step in our investigation involved coding instances of ISB from the testimonies. We followed the general principles of coding suggested by Hsieh and Shannon (2005). First, we drafted an analysis plan. Since we had objectives, such as to provide a detailed account of disaster-related ISB from oral documents in our analysis, we focused on the main ISB

factors: information needs, information sources, and information channels. We also aimed to provide empirical evidence to show the temporal stages of disaster on ISB instances. To achieve these objectives, we took a content analysis approach to data analysis.

Table 3.3 shows an example of a testimony oral document, a first-person account of male, age unknown. The document has a title, address, name, and age of the author. From the main testimony, we identified descriptions about how the person actively sought information about the fuel supply.

Second, ISB instances were coded. Like other coding processes, our coding was an iterative process. Although we had the basic overall categories of information needs, information sources, and information channels prior to starting the coding, examples were added and revised during the process of coding the testimonies. The coding was based on instances level not based on sentences level, so that one instance could consist of one or more sentence. If, for example, one information need has more than two information channels, we separate each information channel with the same information needs.

We establish reliable coding by generating and updating our codebook during the process. Table 3.3 shows a set of final ISB codes assigned to this part of the description. We took a similar approach to the coding the temporal stages of a disaster. We identified each annotation with information needs, information channel, information sources, and temporal stages. After repeating this process several times, we reviewed the result for incomplete or missing data.

Table 3.3 Coding examples of testimony from document ID no. 3

Transcription	Code
ガソリン調達のため新潟へ	Title
_____氏	Name (Omitted)
久保木商会代表取締役社長	Occupation
平沼ノ内	Address
<p>地震のときは店にいましたが、大きな揺れが続いたため急いで店の外に出ました。その後、福島県に大津波警報と発表されたため、家族とともに一時避難しましたが、午後9時ころガソリンスタンドに戻ってみると、設備は無事で、営業は可能でした。</p>	
<p>ガソリンについては、通常週3回ほどタンクローリーからスタンドに給油されており、震災当日も午後に給油される予定でしたが、震災により給油がキャンセルとなってしまいました。当日、そして翌日と店に残っていたガソリンを訪れた人に給油しましたが、あっという間に底をついてしまったため、3月13日には休業せざるを得ない事態となりました。</p>	
<p>3月16日の夜8時に、政府調達ガソリンが搬入されたため、9時には販売を再開することができました。高久小学校に避難している周辺の被災住民の方を優先にガソリンを提供するなどの配慮をしました。</p>	
<p>その後、メーカー（昭和シェル）のガソリンが震災後初めて、3月26日に入りました。このようにガソリン不足が続くなか、メーカーに直接連絡したところ、新潟にある輸入基地に取りに来ればガソリン供給可能との確認を得て、早期のガソリン供給に向け、小名浜のローリー会社から20klタンクローリーをチャーターして、3月28日から4月3日まで毎日新潟まで通い、持ってきてガソリンを供給してきました。</p>	<p>“...Until March 26th, the gas shortage continues. As a result, I contacted the manufacturer. They said I could get the gasoline supply if I come to collect...” (Male, age unknown, document ID no. 3)</p> <ul style="list-style-type: none"> • Active Information Needs (Post-disaster Supplies) • Information Channel (Phone) • Information Source (Work community/Colleagues) • Temporal Stages (6 Remedy)
<p>とにかく、ガソリン不足で被災地救済の活動のみならず、生活そのものが大きな影響を受けるなか、何とか事態を打開したいという強い思いでしたね。</p>	
<p>市内でガソリンの安定供給ができるようになったのは、4月も末のことでした。</p>	
<p>(平成24年2月取材)</p>	

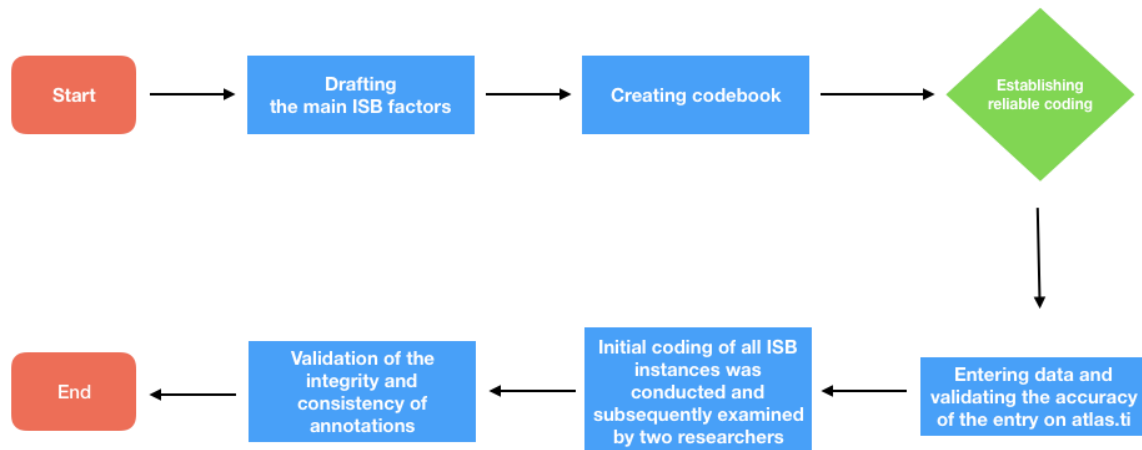


Figure 3.1 Content analysis coding process

Third, we entered the data the qualitative data analysis and research software named, atlas.ti. The initial coding of all ISB instances was conducted and subsequently examined by two researchers in ISB domain. The disagreement between the two was jointly resolved by close re-examination of corresponding cases and discussions. The final step involved the validation of the integrity and consistency of annotations. Having accurate annotations of ISB was of primary interest, and thus, inferential statistics regarding the relationship between ISB concepts, and the effect of temporal stages on disaster-related ISB were not obtained due to sample size. Therefore, we opt for descriptive analysis in this chapter.

3.3 Results

3.3.1 Information needs modes, information channels, and information sources identified from testimonies

In all, 285 ISB instances were identified in 118 testimonies as the result of the coding process. We then grouped together similar instances and formed major categories and examples for information needs, information channels, and information sources by using content analysis steps which are summarised in Table 3.4 (Hsieh and Shannon, 2005).

As for information needs, we formed similar major categories for coding two prominent modes of fulfilling the needs emerged from the analysis of ISB instances. One was via purposeful active seeking of information (McKenzie, 2003), and another was a result of passively receiving or encountering the information (Wilson, 2000). Since the categories and frequency of information obtained or received by the two modes appeared to vary, they were of our interest to compare. This led us to divide the concept of information needs into active information needs and passive information needs. The difference between the two types of information needs is given as follows.

Active information needs refer to a set of needs inferred from the description of purposeful ISB to answer a specific query (McKenzie, 2003). An example of the description where active information needs were identified is “Until March 26th, the gas shortage continues. As a result, I contacted the manufacturer. They said I could get the gasoline supply if I come to collect” (Male, age unknown, document ID no. 3). Here, we can infer that the person actively sought information about the fuel supply. In Figure 3.2, there are 71 instances of active information needs in our dataset.

Passive information needs, on the other hand, refers to a set of needs inferred from the description of the information people passively received or encountered when they were not actively seeking. An example of the description where passive information needs were identified is “I heard someone shouting about the tsunami warning. And, I saw and heard a government helicopter giving evacuation instructions.” (Male, 63-year-old, document ID no. 1). Here, we can infer that the person received or encountered the information about tsunami warning and evacuation instructions although he was not actively seeking them. In Figure 3.2, there are 214 instances of passive information needs in our dataset.

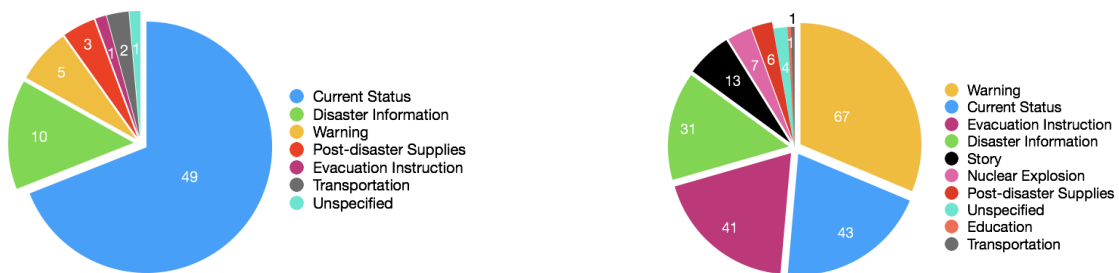
Table 3.4 Main categories and examples of information needs, information channels, and information sources

Concept	Main category	Examples
		*Please note that the examples provided below will sign as ‘A’ for examples found in active information needs; and ‘P’ for examples found in passive information needs.
Information needs	Current status	Family status, acquaintance status (A, P) Regional damage condition, Iwaki city condition, and Tohoku condition (P)
	Disaster information	Disaster information, damage and loss information, disaster preparedness information, earthquake information, tsunami information (A, P)
	Education	School postponement, and entrance exam result (P)
	Evacuation instruction	Evacuation instruction, and finding shelter (A, P)
	Nuclear explosion	Explosion in power plant (P)
	Post-disaster supplies	Water outage and saving water, gasoline and diesel supply, support material and water, food, clothes distribution (A, P)
	Story	Stories about past events (P)
	Transportation	Road closure and public transportation information, and train condition (A, P)
	Warning	Earthquake Early Warning (EEW), and tsunami warning (A, P)
	Unspecified	No (active or passive) information needs, and information needs were not clearly defined (A, P)

Information channels	Face to Face	People shouting, student's shouting, and teacher's instruction
	Internet	Government or agency website
	Mail	E-mail or text message (phone)
	Phone	Mobile phone, and public telephone
	Radio	Radio, cell phone radio, car radio, wireless radio, and radio station
	Speakers and signage	Ambulance and fire brigade trucks, city's public relation car, helicopters, office speakers, police car, resident speakers, and school's broadcasting
	Television	News, Kobe television, NHK television, and in-car television
	Unspecified	No information channel and channel were not clearly defined
	Information sources	Broadcast media
Family/Neighbourhood		Family, friend, neighbourhood, and someone
Foreign government		Australian government
Health and safety		Ambulance, fire brigade, local fire volunteer department, nuclear safety commission, person from health centre, and police
JMA		Information source from Japan Meteorological Agency (JMA)
Local government		City hall staff, district officer, Fukushima Prefecture, ministry, prefecture leader, company's resident, public relations, and support centre
Work community/Colleagues		Consumer, shop staff, parent or guardian, kindergarten president, head of the parent-teacher association, school student, and teacher
Unspecified		No information source and source were not clearly defined

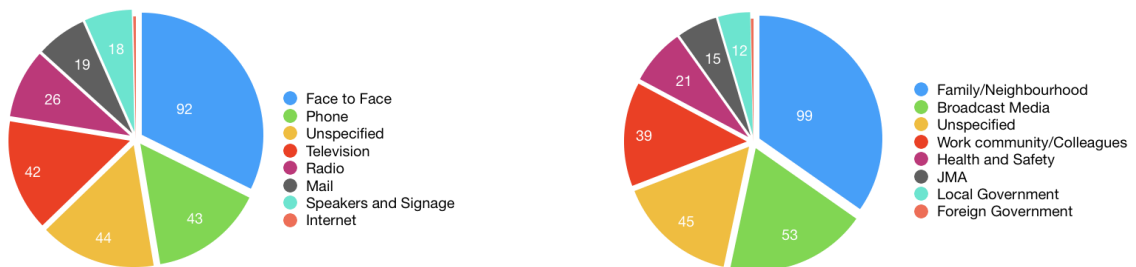
This suggests that people passively received or encountered disaster-related information more frequently than actively seeking them. Also, the number of main categories in Figure 3.2 suggests that people got a wider range of information in a passive manner (ten categories) than active manner (seven categories), although they share several categories in our dataset. For instance, the information about the evacuation instruction was both sought actively and received passively, and thus, it appeared in both categories, while the information about nuclear explosion and education was only appeared in the passive need category.

In active information needs, testimonies indicated that current status ($N = 49$) of family and acquaintances was the most frequently sought information, followed by disaster information ($N = 10$), warning ($N = 5$), and post-disaster supplies ($N = 3$). In passive information needs, frequent categories were warning ($N = 67$), current status ($N = 43$), and evacuation instruction ($N = 41$). For instance, information regarding the instruction to evacuate and find shelter were also included in the evacuation instruction category.



(a) Active information needs distribution

(b) Passive information needs distribution



(c) Information channels distribution

(d) Information sources distribution

Figure 3.2 Distribution of disaster-related ISB concepts

Information channels ($N = 285$) are a route or medium whereby people obtained or received information from information sources ($N = 285$). From the earlier example of passively receiving tsunami warning and evacuation instructions, one can infer that tsunami warning was received from someone in the neighbourhood via a face-to-face communication channel, while evacuation instructions were received from the local government via a channel of (helicopter's) speakers. Our data indicate that information channels included face to face ($N = 92$), phones ($N = 43$), TV ($N = 42$), and radio ($N = 26$) with a reasonably similar level of frequency. As for information sources, families and neighbours ($N = 99$) were the most frequent category followed by broadcast media ($N = 53$), work community/ colleagues ($N = 39$), and health and safety-related organisations ($N = 21$).

3.3.2 Relationships between concepts

Now that we have identified the major categories of passive and active information needs, information channels, and information sources from testimonies, the next section will examine the relationships between the four concepts to understand the interplay between disaster-related ISB concepts.

A. Information needs and information channels

Figure 3.3(a) and 3.3(b) shows the proportion of information channels used by the major categories of passive and active information needs, respectively. For example, passive information needs such as current status, disaster information, evacuation instruction, and warning were obtained through via diverse information channels. An example from a story related to passive information needs states, “The neighbourhood who had evacuated told me that the house was inundated by the tsunami” (Female, age unknown, document ID no. 3).

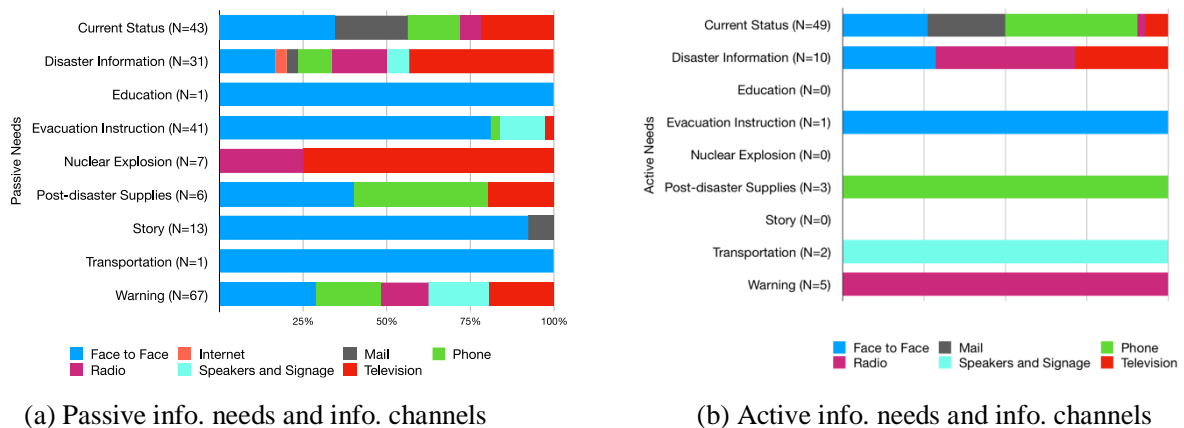
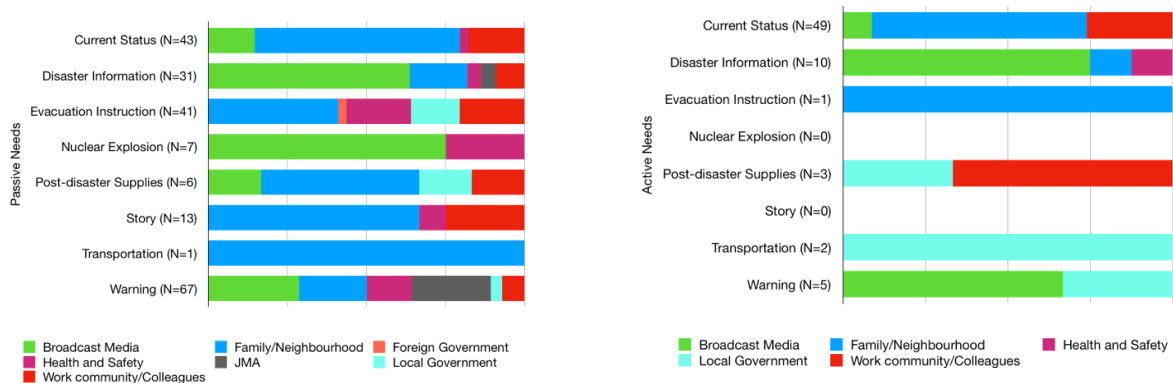


Figure 3.3 Relationship between information needs and information channels

The trend appears in the information channels used by active information needs shows that the frequency of occurrence varies across major categories. The results allow us to understand the diversity of information channels used by different information needs. The findings also highlight that the range of information channels used by active information needs is more limited than those of passive information needs.

B. Information needs and information sources

Figure 3.4(a) and 3.4(b) present the proportion of information sources used by the major categories of passive and active information needs, respectively. From Figure 3.4(a), it is evident that source from family/neighbourhood appears in most passive information needs category, except in nuclear explosion category. A similar trend also appears in active information needs and information sources (see **Figure 3.4(b)**), family/neighbourhood also appears in current status category as the larger proportion among active information needs. This result is suggesting that people’s information sources can vary across types of information needs.



(a) Passive info. needs and info. sources (b) Active info. needs and info. sources

Figure 3.4 Relationship between information needs and information sources

C. Information sources and information channels

Figure 3.5 presents the proportion of information channels used by information sources, whereby data of passive and active information needs are aggregated. The results show the diversity of information channels used to access different information sources. From Figure 3.5, it is evident that information sources including family/neighbourhood, work community/colleagues, and local government, were accessed via diverse information channels, suggesting that people do not rely only on a single means to access data.

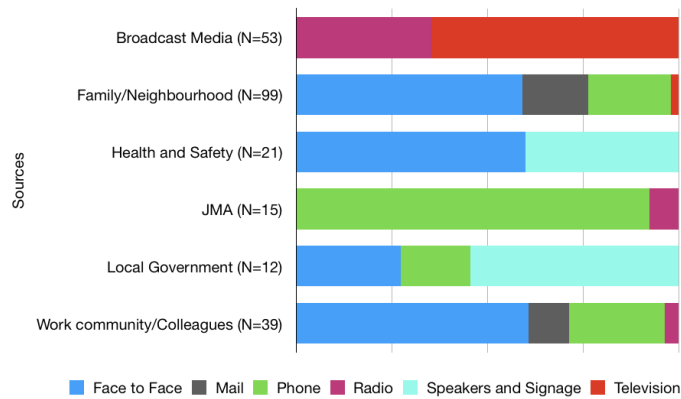


Figure 3.5 Relationship between information sources and information channels

3.3.3 Temporal stages of disaster

The final part of our analyses investigates the role of temporal stages of disaster on ISB. By studying temporal stages of a disaster within the context of disaster-related ISB, this will give insight about the difference with typical behaviour described in everyday life or work-related situations. Each instance of ISB identified in the testimonies was classified into one of Powell (1954)'s eight stages. The instances categorised to the temporal stages are pre-disaster (2), warning (77), threat (38), impact (89), inventory (65), rescue (2), remedy (6), and recovery (6). As we found that there were not as many occurrences of pre-disaster, rescue, remedy, and recovery categories in the testimonies, we decided to focus on warning, threat, impact, and inventory, and to avoid bias in our analysis due to small samples. The following are some examples of the categories for the temporal stages from testimonies.

- **Stage 1: Warning** is the precautionary activity includes consultation with members of own social network, for example, “I heard public information of the tsunami warning vaguely ringing the siren” (35-year-old male, testimony from document ID no. 1)
- **Stage 2: Threat** is perception of change of conditions that prompts survival action, for example, “I was repeatedly told by my son who was nearby, ‘Run away! It is dangerous!’” (Female, testimony from document ID no. 2)
- **Stage 3: Impact** is a stage of “holding on” where recognition shifts from individual to community affect and involvement, for example, “... a man who was trying to evacuate with

a car called me, ‘Are you alright?’ I replied, ‘I do not know where I should go and there are no cars’” (18-year-old female, testimony from document ID no. 1)

- **Stage 4: Inventory** is a stage of the individual takes stock and begins to move into a collective inventory of what happened, for example, “An e-mail arrived from a friend on the way saying that it seems that a tsunami has reached Otsu City” (57-year-old female, testimony from document ID no. 1)

Figure 3.6 and 3.7 present the proportion of major categories in four concepts across the temporal stages of disaster. When the proportion of major categories varies across temporal stages, one can summarise that temporal stages can be used to characterise these four concepts.

Figure 3.6(a) and 3.6(b) present the relationship between the temporal stages and passive and active information needs, respectively. A clear pattern of temporal stages on the proportion of information needs is evident. Passive information needs such as warning and evacuation instructions were more common in the warning and threat stages, while current status, disaster information, story, education, transportation, and post-disaster supplies increased in proportion in the impact and inventory stages. Active information needs show people actively sought current status information across all four stages. Therefore, the temporal stages of disaster can allow for the separation of information needs that are temporarily sensitive (e.g., warning) from those that are not (e.g., disaster information).

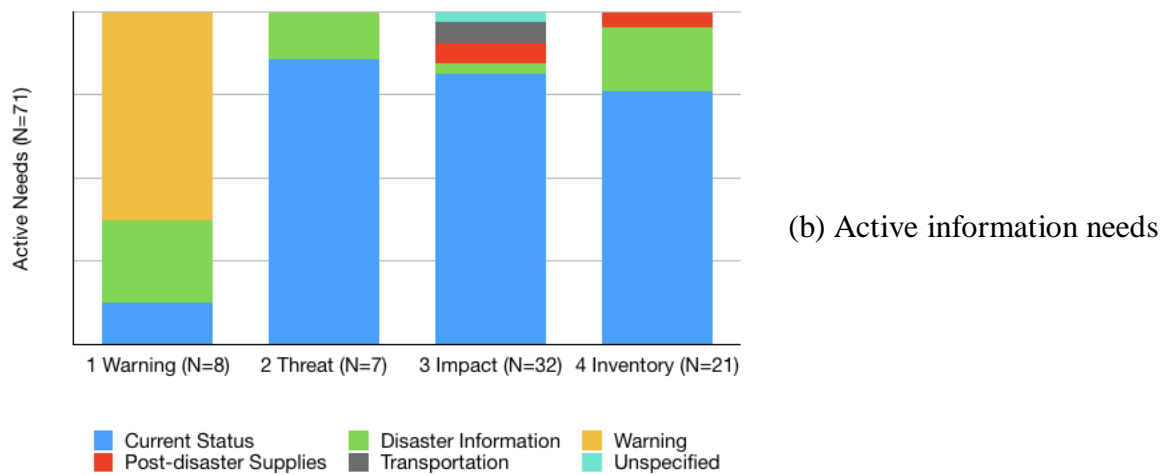
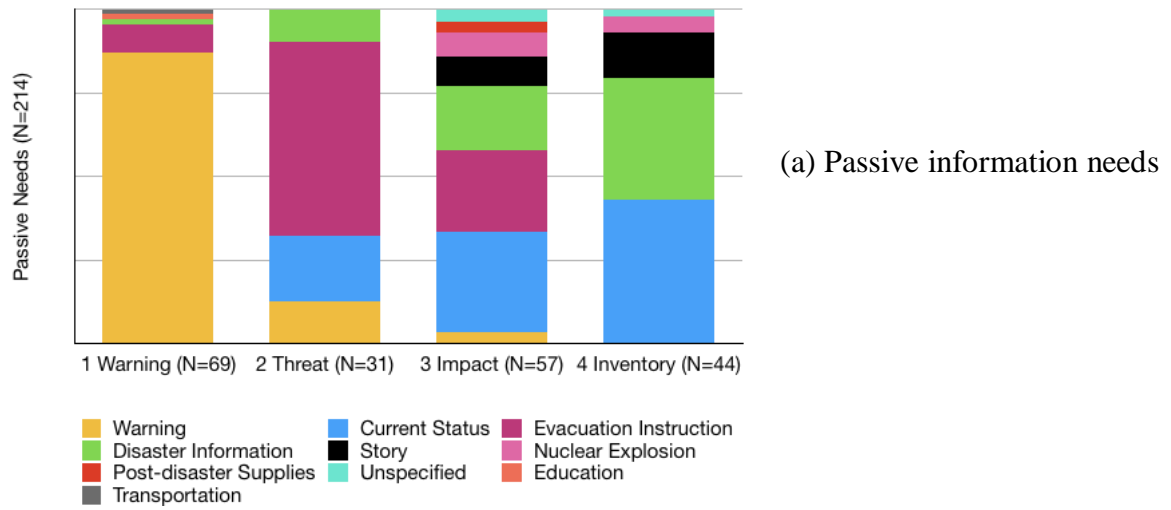


Figure 3.6 Relationship between temporal stages and information needs

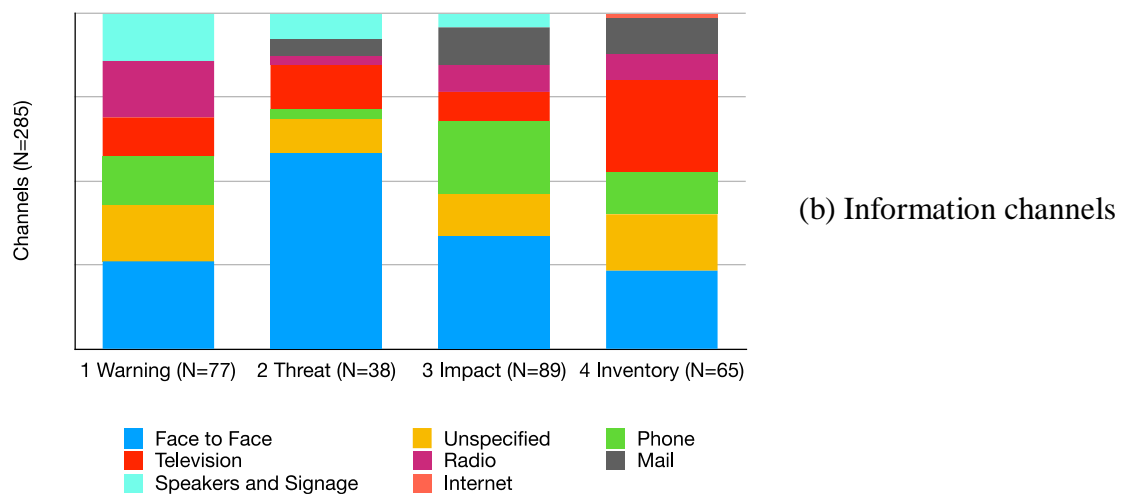
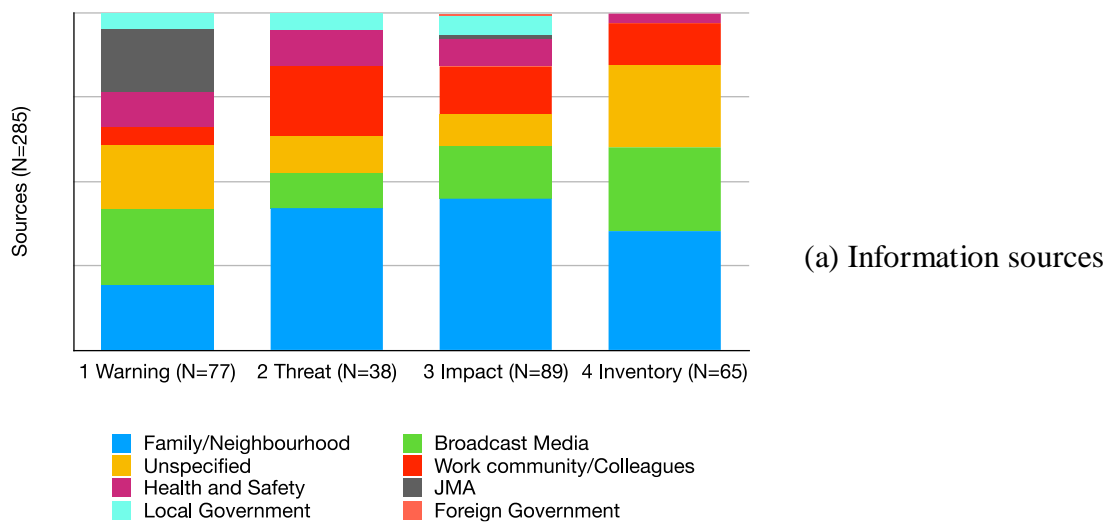


Figure 3.7 Relationship between temporal stages and information sources, channels

Figure 3.7(a) and 3.7(b) present the relationship between the temporal stages and information sources and information channels, respectively.

One observed pattern is that information sources were used similarly across the temporal stages of a disaster, unlike other concepts. On the other hand, information channels exhibit different patterns across temporal stages. For example, face-to-face was used more on threat stage and has a similar ratio on warning, impact, and inventory stages. Speakers and signage

were more active at warning and threat stages. Phone, radio, and TVs were relatively consistent across all stages.

In summary, we observed from our dataset that information needs (both passive and active) and information channels were interplayed by the temporal stages of a disaster, while information source was found to be relatively stable against the temporal stages.

3.4 Summary

The first part of our contribution to this field of study was to provide a detailed account of disaster-related ISB in the context of the 2011 Great East Japan Earthquake (and tsunami). The four main concepts examined included active information needs, passive information needs, information channels, and information sources. Our analyses suggest that information such as current status, disaster information, and warning represent some of the common active information needs, while warning, current status, evacuation instruction, and disaster information are among the common passive information needs. Infrequently annotated concepts such as transportation and education-related needs are equally important in our study to understand the breadth of information needs sought during a large-scale natural disaster. We have also identified several categories of information channels and information sources. Our analyses suggest that most information channels were frequently used by people, with no particular category being more popular than another, as such information sources were varied. Family and neighbourhoods were far more popular information sources than other categories such as broadcast media.

The second part of this study's contribution was to examine the relationship between the four concepts to gain further insight into disaster-related ISB. The main findings indicate that some information needs were obtained by a limited number of information channels, while diverse information channels met other needs. Passive information needs were obtained by wider information channels than active information needs. Moreover, the two types of information needs (active and passive) tended to use a different set of information sources. Upon examining the relationship between information channels and information sources, most information source categories were accessed via multiple information

channels, suggesting that people are not relying on a single means to access information sources during disasters.

The final part of this study's contribution was to examine the relationship between the temporal stages of disaster and disaster-related ISB. Our analyses suggest that concepts such as information needs (both active and passive) and information channels can exhibit different patterns across the temporal stages, while information sources remained relatively consistent. The pattern of temporal stages on passive and active information needs was similar in many categories, although a certain category of information was frequently sought in a particular stage of the disaster. For example, information about the family and acquaintance status was actively sought only at the impact and inventory stages of the disaster. As for the information channels, face-to-face was more common at warning and threat stages, while the frequency of phone and mail increased at the impact and inventory stages of a disaster. This might be due to the fact that people had to secure their safety first at warning and threat stages and they could only seek information about their families after the safety was secured. These highlight the importance of considering temporal stages of disaster within disaster-related ISB.

CHAPTER 4

The Use of Sight, Hearing, and Touch on Information Seeking Behaviour of the Great East Japan Earthquake

4.1 Aim and objectives

The human senses are integral in the human body. In everyday lives, people often speak about what they see, hear, smell, taste, and touch, for example, about the weather we see, the music we listen, or the food we taste. The senses represent an immense data collection, aggregation, and archive related to one's surroundings that allow the brain to understand the environment and its effect on the body in real time (Towey, 1999).

In information science, the observation of bodies in action was first reported in the context of corporeal information, which can be understood as “information that is experienced through the situated and sensory body as it interacts with material objects, artefacts and other people inhabit the same landscape” (Lloyd, 2009). Lloyd (2009) suggests that the body becomes the location for the intersection between conceptual information and information drawn from real life through practice. More recently, work in information behaviour recognises the importance of embodied information, which is defined as “how the authors receive information from the senses and the way the body conveys a sign that can be read by others”, when we study Information Behaviour in non-work-related activities such as serious leisure. However, the findings of the role of corporeal information or embodied information in ISB are limited. For example, existing studies on this topic tend to focus on a single sense without considering the relationship to other senses (Balatsoukas and Ruthven, 2012; Olsson and Lloyd, 2017). Consequently, Cox et al. call for more empirical and theoretical work to gain insights from practice theory, phenomenology, embodied cognition and sensory studies (Cox et al., 2017).

However, although an impressive number of ISB studies emerges especially studies of the body in information behaviour, a limited number of studies investigates senses on disaster-

related ISB (Wilson, 2000; Peter Lueg, 2014). This happens because studying human senses on disaster-related ISB poses many challenges. First, discovering what humans perceive is difficult. Senses are not only invisible but also body orientation-related aspects influence what human perceive (Peter Lueg, 2014). Second, popular data collection methods, such as surveys and interviews, show limited insights into what information a subject failed to notice, and typically no insights into why they failed to do so (Peter Lueg, 2014; Cox et al., 2017). Although complementing those data collection methods with ethnographic methods would address some of the data collection issues, the additional effort is high, and accuracy can be compromised (Peter Lueg, 2014). Third, most of the current works in information behaviour excel at one side of the perception while disregarding the other, for example, a study on haptic analysis (Olsson and Llyod, 2017) and gaze direction (Balatsoukas and Ruthven, 2012). This is also due to the focused environment of their works, primarily work in the excavation field which often uses the sense of touch and the use of computers as the domain of study which often uses the sense of sight. Thus, these challenges often prevent the study and the development of disaster-related ISB models.

Referring to an example of the categories for the temporal stages from testimonies such as, “I **heard** public information of the tsunami warning vaguely ringing the siren” (35-year-old male, testimony from ID document no. 1), our findings suggests that human senses can play a significant role (**see 3.3.3 temporal stages of disaster**). Building on previous study, we then decide to carry out further investigation on human senses to provide a better understanding of disaster-related ISB. Unlike past work which focused on serious leisure such as running, this study investigates ISB during natural disasters such as earthquakes and tsunami. We chose natural disaster-related ISB because 1) the goal of information seeking is different from work-related or leisure-based activities, and 2) the use of body and senses is intense during natural disasters (Lloyd, 2009). The following are the research questions:

- RQ1: How do the human senses interplay with disaster-related ISB?
- RQ2: How are the use of senses in disaster-related ISB affected by age, gender, and location?

To answer these research questions, we employ a content analysis to label the human senses and disaster-related ISB instances, and to determine an early connection and uncover an association between the senses and a set of disaster-related ISB instances, such as passive

and active information needs, information sources, and information channels (Hsieh and Shannon, 2005; Krippendorff, 2005).

4.2 Methodology

A content analysis was employed to investigate the use of human senses during the disaster-related ISB (Hsieh and Shannon, 2005). We decided to use one of the largest people’s testimony collections of the 2011 Great East Japan Earthquake and Tsunami, recorded and published by the Japan Broadcasting Corporation (NHK) (NHK, 2013; NHK, 2014; NHK, 2015). On the previous study, although a number of people’s testimonies is good for establishing a set of disaster-related ISB concepts (e.g., passive and active information needs, information sources, and information channels), the distribution of demographic characteristics, such as age and location, were skewed. Moreover, we are moving to larger collection to examine multiple collections rather than relying on a single collection. A total of 614 people’s testimonies can be retrieved in NHK books; but we sampled 269 people’s testimonies, which can be retrieved not both in NHK books and NHK digital archive (nhk.or.jp/archives/311shogen/) (see Table 4.1).

Table 4.1 A summary of the testimony collection

ID	Document title	Publication Date	Number of Testimonies	Full-text on web
1	Record of Testimony on The Great East Japan Earthquake: 1	February, 2013	283	144
2	Record of Testimony on The Great East Japan Earthquake: 2	February, 2014	178	68
3	Record of Testimony on The Great East Japan Earthquake: 3	February, 2015	153	57

In our investigation, the next step involved coding instances of the (five) human senses and a set of disaster-related ISB instances in the testimony texts using a crowdsourcing service (lancers.jp) from July 2017 until August 2018. We ran screening tasks on senses and disaster-related ISB instances, separately, before we label 269 people’s testimonies. This screening tasks’ goal was to find reliable crowd workers, i.e. individuals who achieved the test accuracy with a score of 80% or above before they annotated our dataset (Shiga et al.,

2017). For screening and project tasks, we provided similar instructions. An example of the labelling instructions regarding the senses can be found in Table 4.3.

Table 4.2 Screening and project tasks instruction on human senses to crowd workers

Japanese	Transliteration
<p>本タスクでは、震災体験談の文章を、あるルールに従って分類していただきます。具体的には、各文章に対して人間の五感を使った記述が含まれているかを判断していただきます。</p> <p>今回分類していただく五感は、視覚、聴覚、味覚、嗅覚および触覚です。それぞれの定義と該当する例文をよく読んで、その特徴を理解した上でタスクを実施してください。また、一つの文章で1つ以上の感覚が該当する場合は、複数の選択肢を選択することができます。</p> <p>1. 視覚は見ることのみまたは能力のことである；見えるものまたは見られるもの。 例：「パッと見たら、波が立って来たんですよ。」</p> <p>2. 聴覚は音を知覚する能力である。 例：「そのうち瓦が、ガチャガチャと落ちてくる。」</p> <p>3. 味覚は物質と口または喉との接触時に感知される風味の感覚である。 例：「このバターはすっぱい味がする。」</p> <p>4. 嗅覚は鼻の器官によって匂いや香りを感じる能力である。 例：「ちょっとにおいの臭いもの。」</p> <p>5. 触覚は身体の一部が何かに触れる行為である。 例：「波に、私が乗っかっちゃったっていう感じだと思うんですよ。」</p> <p>6. なし</p>	<p>In this task, you will classify sentences about experiences related to the earthquake disaster according to certain rules. Specifically, you will judge whether each sentence contains a description of the five human senses.</p> <p>The five human senses you will classify are: sight, hearing, taste, smell and touch. Please carefully read each definition and applicable example sentence to fully understand each sense's characteristics and complete the task. Also, if more than one sense occurs within a single sentence, you can select more than one choice.</p> <p>1. Sight refers to the ability to see; i.e. what is seen. Example: "When you see it, the wave has come up."</p> <p>2. Hearing is the ability to perceive sound. Example: "The roof tile falls ashore."</p> <p>3. Taste sensation refers to a flavour that is sensed when a substance comes into contact with a mouth or throat. Example: "This butter tastes sour."</p> <p>4. Smell is the ability to sense odour and scent by the nose organs. Example: "It smells a little."</p> <p>5. Touch is when a part of the body touches something. Example: "It's like I got on the waves."</p> <p>6. None</p>

In the screening task, we invited 200 crowd workers per ISB concepts and senses for each round. Information channels and senses were easy categories; while passive and active information needs and information sources were difficult categories to pass the screening tasks. Further, other screening tasks were needed for passive and active information needs, and information sources until we fulfil the adequate number of workers that will be assigned to the project tasks. For incentives, we pay 300 JPY for one person per screening task.

Those workers who passed the screening test were then invited to code people's testimony texts, called project task. A total of 6,566 sentences from 269 people's testimonies were divided into 300 lines of 20 pages on .pdf file and labelling result is written in the given .xls file, and were assigned to diverse workers to label human senses and a set of disaster-related ISB instances, separately. Those workers need to complete the task within 5 (five) days with the payment amount of 1,875 JPY. To annotate sentences with a reliable label, we recruited three workers per sentence. It is common for researchers to hire two or more coders to ensure the consistency and reproducibility of labelling in the content analysis (Hsieh and Shannon, 2005). Voting was used to determine the final label suggested by the crowd (Yuen et al., 2011). If an agreement was not achieved between the three workers, we recruited another worker to annotate until a majority consensus was achieved. This process we repeated for all ISB labels across all sentences.

In our case, one sentence judged by three crowd workers' votes for four ISB instances and human senses; thus, a total of more than 96,660 votes have been collected. The use of crowd intelligence makes it possible to complete the tasks that cannot be automated, such as providing input labels for initial training (Imran et al., 2014; Shiga et al., 2017). Figure 4.1 shows the whole crowdsourcing process.

The screening tasks and project tasks instruction and questions could be found in Appendix B, C, and D.

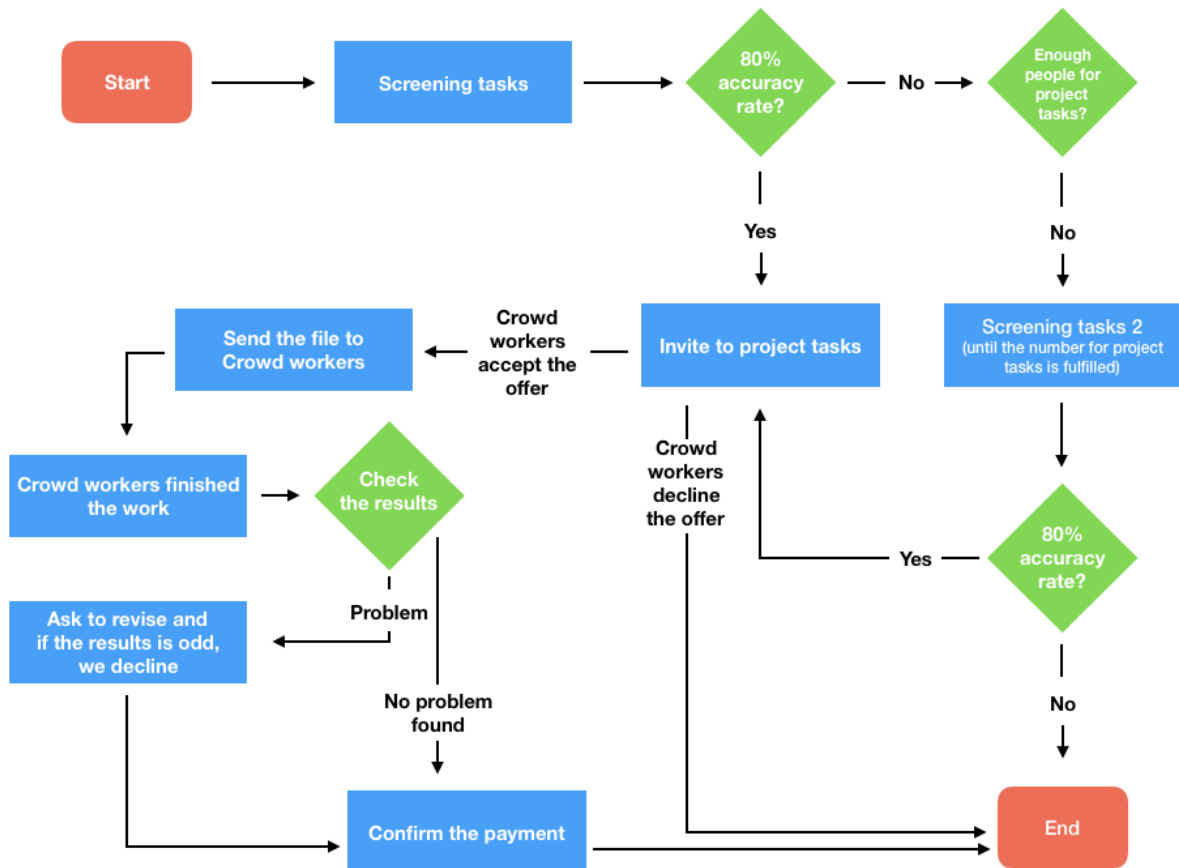


Figure 4.1 Crowdsourcing process

Furthermore, we then removed those sentences without disaster-related ISB instances from the analysis. Of those, 259 people’s testimonies that consist of 6,444 sentences were selected for analysis. Table 4.2 shows the age, gender, and location group of 259 people’s testimonies.

Table 4.3 Age, gender, and location group of testimonies ($N = 259$)

Age	Gender	Location
Adolescence (13-19)	4 Female	69 Fukushima 78
Early adulthood (20-39)	32 Male	190 Iwate 90
Adulthood (40-64)	140	Miyagi 91
Maturity (65>)	78	
Not available	5	

As for age groups, we used Erikson's lifespan stages psychosocial development theory to divide the age categories into adolescence (13-19), early adulthood (20-39), adulthood (40-64) and maturity (65>), since this is one of the most well-known categorisations of ages in social studies (Erikson, 1950, 1968). As for location, we chose three severely affected areas to capture prominent impacts of the event: the Fukushima, Iwate, and Miyagi Prefecture.

As for analysis, we employed descriptive analysis between the senses and ISB instances, and a chi-square statistical analysis to uncover any associations between the senses and the modes of information needs, as well as between the senses and demographic characteristics using the IBM SPSS Statistics (Field, 2009). For significant results, we run the post hoc analysis using Bonferroni correction also using the IBM SPSS Statistics following the steps described in Beasley and Schumacker (1995), Garcia-Perez and Nunez-Anton (2003), and Field (2009).

4.3 Results

A total of 1,791 sense-bearing sentences were collected from 6,444 sentences of 259 people's testimonies in the context of disaster-related ISB, and they were analysed in this study. Three senses were appeared in the annotation, such as Sight ($N = 933$), Hearing ($N = 734$), and Touch ($N = 124$). The following is examples of the senses from the testimonies.

- Sight: "I was also watching the broadcasting of the tsunami often in movies, but it seems that something like this is going to be a big wall, becoming a black wall, and all of them are going to strike us." (Adulthood (40-64), Female, Miyagi).
In Japanese: 「何か映画でも、よく大津波の放送をされたのも見ていたんですけど、そういうものが何かこう、大きな壁になって、黒い壁になって、全部私たちのところに押し寄せてくるみたいなの。」
- Hearing: "The radio was broadcasting how many meters tsunami was all the time." (Adulthood (40-64), Female, Miyagi).
In Japanese: 「ラジオは、もう本当ひっきりなしに、津波何メートルと言っていますからね。」
- Touch: "In a little while the water got higher and steadily getting higher and higher, the car seemed to float, so I brought it over there." (Adulthood (40-64), Female, Iwate).

In Japanese: 「ちょっとの間に水が高くなって、どんどんどんどん高くなって、車が浮いていくような感じで、あっちに持っていかれちゃって。」

There were sentences where multiple senses were annotated within disaster-related ISB context (Figure 4.2). For example, both sight and hearing can be observed from the following sentences, “I noticed a traffic sign of road closure around here, and I was stopped by the city council officer and told, “Please turn around and go to the higher ground.” (Early adulthood (20-39), Female, Iwate). In Japanese: 「この辺りで通行止めの標識が出ていて、役場の方にこの辺りで止められて、「う回して、高台の方に行ってください」と言われて。」

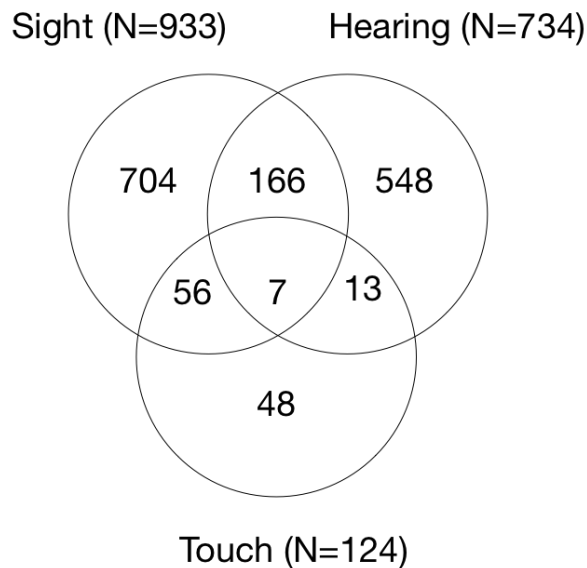


Figure 4.2 Distribution of senses ($N = 1,791$)

There were 166, 56, 13, and 7 sentences within disaster-related ISB context where sight and hearing, sight and touch, hearing and touch, and sight, hearing and touch were observed together, respectively. Thus, in our analysis multiple-sense sentences within disaster-related ISB context were counted as separate cases.

Disaster-related ISB consists of complex behaviour; for example, a person becomes aware of surroundings in a disaster situation rather than in everyday lives that make the best use of their senses. In this thesis, the analysis is based on the sentence level, thus a particular case

for labelling human senses, we provide a choice for crowd workers that each sentence has more than one senses. If there are two senses on one sentence and also has one ISB instances, we replicate the sentences within disaster-related ISB context and put senses on a different row.

Thus, statistically speaking, applying chi-square analysis to uncover any associations will violate some of the assumptions but acceptable to answer our research questions. Co-occurrence of multiple senses in sentences within disaster-related ISB context only makes Chi-Square test challenging to identify independence. Therefore, if the test shows the significant difference in the dataset, that is a clear signal to have the difference. On the other hand, because of the nature of the dataset, it is possible that our test misses the cases where the independence was indeed there but not picked up by the test.

4.3.1 The use of senses in disaster-related ISB instances

To understand the relationship between the senses and a set of disaster-related ISB instances, we looked at the proportion of the senses in the major information seeking concepts such as information needs, information sources, and information channels.

In our previous work, we showed that disaster-related information needs can be divided into active and passive information needs. Therefore, our analysis on information needs follows the same structure.

Active information needs refer to a set of needs inferred from the description of purposeful ISB to answer a specific query (McKenzie, 2003). The following is an example of the senses based on active information needs: “Headquarters is in the city hall, so I called them to find out the current status.” (Adulthood (40-64), Male, Fukushima). In Japanese: 「対策本部が市役所にあるんで、そこへ電話して、どんな状況なのと。」 In this sentence, we observed that the person was actively seeking for current status.

Passive information needs, conversely, refers to a set of needs inferred from the description of the information people passively receive and encounter when not actively seeking it out. The following is an example of the senses based on passive information needs: “Because the bridge just cracked in the overhead bridge there, I was told that it was closed.” (Early

adulthood (20-39), Female, Miyagi). In Japanese: 「もう m その陸橋のところで、橋がちょうど亀裂が入ったので、通行止めだと言われてたので。」 In this sentence, we observed that the person was passively received the information about earthquake.

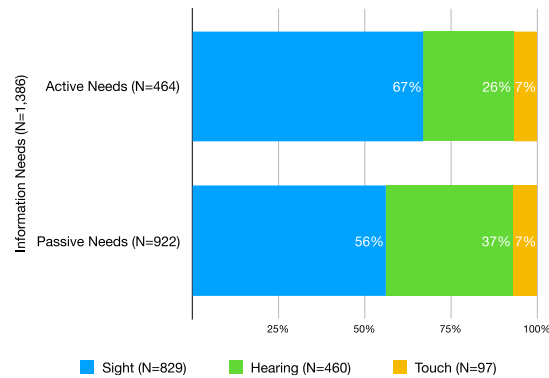


Figure 4.3 Proportion of the senses on passive and active information needs

Figure 4.3 portrays the distribution of the senses based on two modes of information needs: active information needs ($N = 464$), and passive information needs ($N = 922$). According to Figure 4.3, the proportion of sight in active information needs was found to be higher than passive information needs, and the proportion of hearing was lower than passive information needs. Chi-square test shows that there is a significant association between the senses and the modes of information needs, $\chi^2(2, N = 1,386) = 16.707, p < .000$. Post hoc tests using the Bonferroni correction show that the use of sight and hearing are significantly different across the modes of information needs (sight, $p < .000$, and hearing, $p < .000$). However, the sense of touch was not different across the modes of information needs ($p = .920$). Therefore, the use of the senses is affected by the modes of information needs in the context of disaster-related ISB.

Furthermore, Figures 4.4(a) and 4.4(b) depict the decomposition of senses based on subcategories of active and passive information needs that were identified in our study. This allows us to gain further insight into the use of senses across diverse information needs' categories.

The breakdown proportion of senses on active information needs is $N = 311$ for sight, $N = 121$ for hearing, and $N = 32$ for touch. With regard to active information needs, sight and

hearing were identified in all categories except story category, and touch was identified in current status, disaster information, evacuation instruction, and warning. On the other hand, the breakdown proportion of senses on passive information needs is $N = 518$ for sight, $N = 339$ for hearing, and $N = 65$ for touch. The proportion was doubled than active information needs, and Figure 4.4(b) exhibits a similar trend in the senses used by active information needs. The sense of hearing in passive information needs categories, however, was used more frequently than sight.

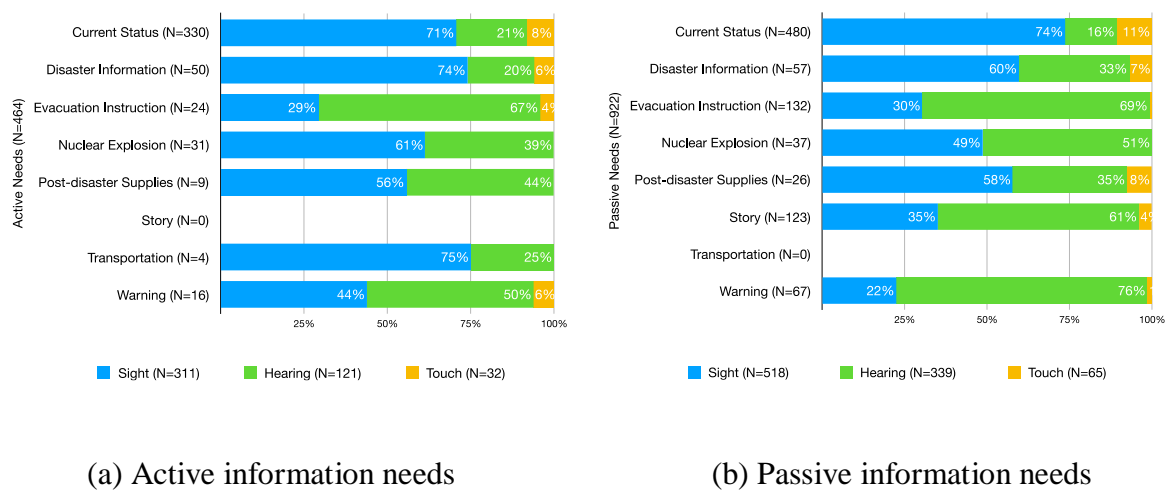


Figure 4.4 Proportion of the senses on information needs

Figure 4.4 suggests that there could be three groups of sense pattern in the results. The first group, such as current status, and disaster information is dominated by sight. The second group, such as evacuation instruction is mostly sensed by hearing. The third group, such as post-disaster supplies, consist of sight and hearing with are similar proportion. And finally, categories such as transportation can be merely found in active need mostly through sight, and story can be found in passive information needs mostly via hearing. Thus, the use of the senses varied across categories when people received or obtained information.

Figures 4.5(a) and 4.5(b) depict the proportion of senses on sub categories of information sources and information channels which have been identified in previous chapter. Information channels are a medium through which people obtain or receive information

from various information sources, for example, “At that time, the firefighters told me that the tsunami had already crossed the breakwater, so run away now.” (Adulthood (40-64), Female, Fukushima). In Japanese: 「その時にはもう、消防団の人が、防波堤を越えて、津波が来ていたよって。だから早く逃げらっせて。」 In this sentence, we identified the use of hearing to receive information from the health and safety-related organisation (sources) via face to face communication (channels). The proportion of senses on information sources and information channels is $N = 933$ for sight, $N = 734$ for hearing, and $N = 124$ for touch.

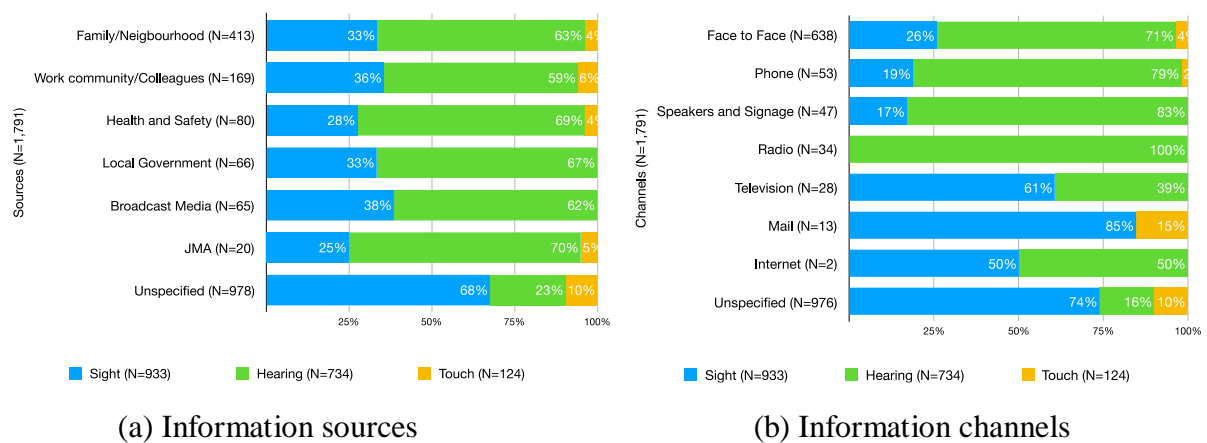


Figure 4.5 Proportion of the senses on information sources and information channels

Figure 4.5(a) suggests that when people sought or received information from a third-party such as family, colleagues, and public sectors, the proportion of hearing was twice as much as sight across all categories. However, the proportion of sight and hearing was conversed in unspecified category. A close examination suggests that many ISB instances in this category include the cases where information was obtained by the person itself. In such cases, the use of sight seems to be more frequent than hearing. Figure 4.5(b) suggest that there are two patterns of sense usage in information channels. The results are expected. In other words, information channels such as face to face, phone, radio, speakers had a high proportion of sight, while tv and mail (include e-mail) tend to have a higher proportion of sight. However, some non-counter-intuitive pattern in information channels appeared. For

example, a sentence where touch was appeared and labelled under phone category within disaster-related ISB concepts, “Because I cannot get in touch with my son at all, I carry the mobile phone all the time even after the tsunami is settled, and my hands gradually become swollen and become tired, and I cannot operate the phone anymore, so I switched to the left hand and use it with the left hand.” (Adulthood (40-64), Female, Fukushima). In Japanese: 「息子とは全然連絡が取れないものですから、その間もずっと私は、津波が収まってからも、ずっと携帯（電話）しまして、だんだん手が、けんしょう炎になって腫れてきて、打てなくなったので、左手に持ち替えて、左手で一生懸命打ったんですね。」

Similar to information sources, information channels also had an unspecified category which includes the cases where information was obtained by the person itself. Since our annotation scheme did not systematically allow us to distinguish the case between self-action and lack of description, the detail analysis of unspecified categories is left for future work.

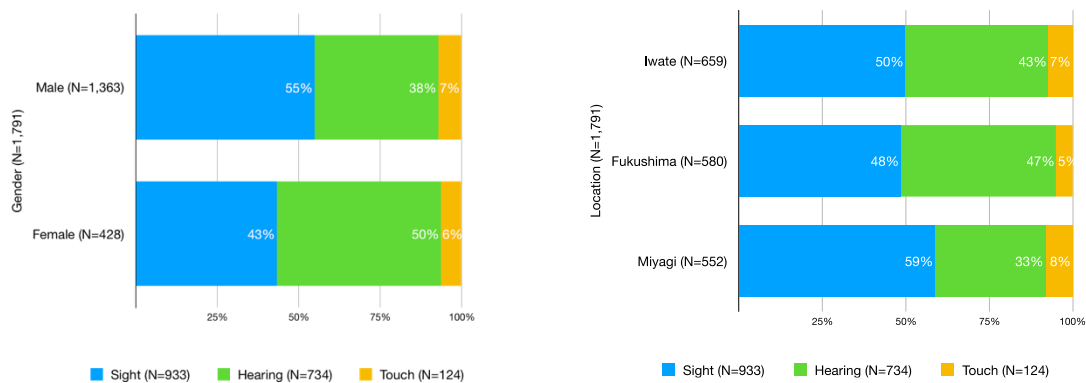
4.3.2 Demographic characteristics on the use of senses

To understand the relationship between the senses and demographic characteristics within the context of disaster-related ISB, Figure 4.6 illustrates the proportion of senses for gender, location, and age.

Figure 4.6(a) depicts the distribution of the senses based on gender. Male has a larger proportion ($N = 1,363$) than female ($N = 428$) in our datasets. According to Figure 4.6(a), the proportion of sight in males' ISB was found to be higher than females and the proportion of hearing was lower than females. Chi-square test shows that there is a significant association between the senses and gender, $\chi^2(2, N = 1,791) = 21.145, p < .000$. Post hoc tests using the Bonferroni correction show that the use of sight and hearing are significantly different across gender (sight, $p < .000$, and hearing, $p < .000$). However, the sense of touch was not different across gender ($p = .548$). Therefore, there is an effect of the sense of sight and hearing on gender in the context of disaster-related ISB.

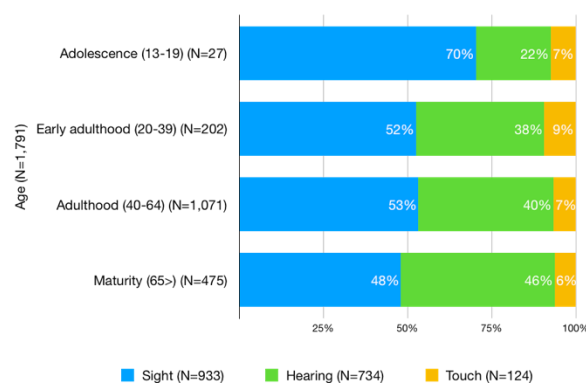
Figure 4.6(b) illustrates the distribution of the senses based on location: Iwate Prefecture ($N = 659$), Fukushima Prefecture ($N = 580$), and Miyagi Prefecture ($N = 552$). According to

Figure 4.6(b), in Miyagi Prefecture, the proportion of sight is greater, and the proportion of hearing is less than for the two prefectures. Chi-square test shows that there is a significant association between the senses and location, $\chi^2(4, N = 1,791) = 25.274, p < .000$. Post hoc tests using the Bonferroni correction show that the use of sight is significantly different on Miyagi Prefecture ($p < .000$), while the use of hearing is significantly different in Miyagi and Fukushima Prefecture ($p < .000$) than in Iwate Prefecture ($p = .230$). However, the use of touch on three prefectures was slightly similar and was not statistically significant. Therefore, there is an effect of location on the use of senses in the context of disaster-related ISB.



(a) Gender

(b) Location



(c) Age

Figure 4.6 Proportion of the senses on demographic characteristics

Figure 4.6(c) demonstrates the distribution of the senses based on age groups. Adulthood (40-64) has the largest proportion ($N = 1,071$), followed by maturity (65>) ($N = 475$), early adulthood (20-39) ($N = 202$), adolescence (13-19) ($N = 27$), and $N = 16$ without age information. According to figure, as the age increases the proportion of hearing increases. On the contrary, the proportion of sight seems to decrease as the age increases. Early adulthood (20-39), Adulthood (40-64), and Maturity (65>) exhibit a similar pattern. Adolescence (13-19), however, differs slightly in that hearing is used less often, and sight is used more often. Chi-square test shows no significant association between senses and age, $\chi^2(6, N = 1,791) = 11.172, p = .083$.

4.4 Summary

Our findings first showed three out of five human senses, such as sight, hearing, and touch was identified from disaster-related people's testimonies.

We then examined the relationship between the senses and two modes of information needs, such as active information needs, and passive information needs (see **Figure 4.3**). This resulted in diverse categories among on active information needs and passive information needs where people use the sense of sight more frequently on active information needs than hearing, while people use the sense of hearing more frequently on passive information needs (see **Figure 4.4**). Our analysis suggests the sense pattern of passive and active information needs is more or less the same. For example, information about current status and disaster information can be gained via sight, and information about evacuation instruction is mostly sensed by hearing. Therefore, passive and active information needs are an important factor to understand the use of senses in disaster-related ISB.

In information sources and information channels, obtaining information from family, neighbourhood, work community, colleague, or public sectors via face to face communication, phone, or speakers was frequently observed (see **Figure 4.5**). Further, the proportion of hearing was often higher than sight in many categories of information sources and information channels. As for the unspecified categories, we speculate that the high proportion of sight is due to the cases where information was obtained by the person itself, but further study is needed to validate this.

Furthermore, there were cases where the use of senses was determined by its sources and channels, not by behavioural choice. For example, if the information is distributed through speakers, people have to use their hearing to receive it. Thus, our result suggests that the proportion of senses can vary across the categories of information needs, information sources, and information channels in the context of disaster-related ISB.

We also examined the relationship between the senses and demographic characteristics, such as gender, location, and age, within the context of disaster-related ISB (see **Figure 4.6**). The use of senses was significantly varied across gender, location, and age groups in the context of disaster-related ISB.

Chapter 5

Datasets Comparison of Disaster-related Information Seeking Behaviour (ISB) Instances

5.1 Aim and methods

Two datasets were collected from different studies in Chapter 3 and 4. The first dataset consists of 118 people's testimonies published by local authorities in Ibaraki and Fukushima Prefectures, respectively. The second dataset consists of 259 people's testimonies that can be retrieved both in NHK books and digital archive. Also, the second dataset was sampled from three affected areas, Miyagi, Iwate, and Fukushima Prefectures, respectively.

Both datasets were applied content analysis to make replicable and valid inferences by interpreting and coding texts from people's testimonies by the author (Hsieh and Shannon, 2005). By systematically evaluating texts, qualitative data were converted into quantitative data.

However, a different manner for producing replicable and valid inferences was different from both datasets. The first dataset validation of the integrity and consistency of annotations were conducted and examined subsequently by two researchers in ISB domain. Moreover, the second dataset was used crowdsourcing platform to complete the tasks in a large number of texts (Yuen et al., 2011; Shiga et al., 2017). Also, the approaches used on the second dataset was suitable for online annotations on digital format, where on the first dataset was merely available on paper format.

Furthermore, we had opportunities to investigate the methods used in both datasets. By comparing both datasets, we gain insight into the impact of the distribution of annotations. Although annotation methods were not identical in both datasets, they shared the basic scheme of data annotations.

This additional chapter aims to compare the distribution of disaster-related ISB annotations in multiple data collections to identify common patterns based on disaster-related ISB instances such as passive and active information needs, information channels, and information sources.

5.2 Datasets comparison of disaster-related ISB instances

Information needs were divided into active and passive information needs. Figure 5.1 shows the second dataset distribution ($N = 1,210$) is larger than the first dataset ($N = 280$) with the proportion of passive information needs ($N = 1,024$) is larger than active information needs ($N = 466$).

On the first dataset, 75% on passive information needs followed by 25% on active information needs. On the second dataset, 67% on passive information needs followed by 33% on active information needs. This shows that the proportion of active information needs on the second dataset is larger than active information needs on the first dataset. However, an overall proportion of the two types of information needs seems to be comparable between the datasets.

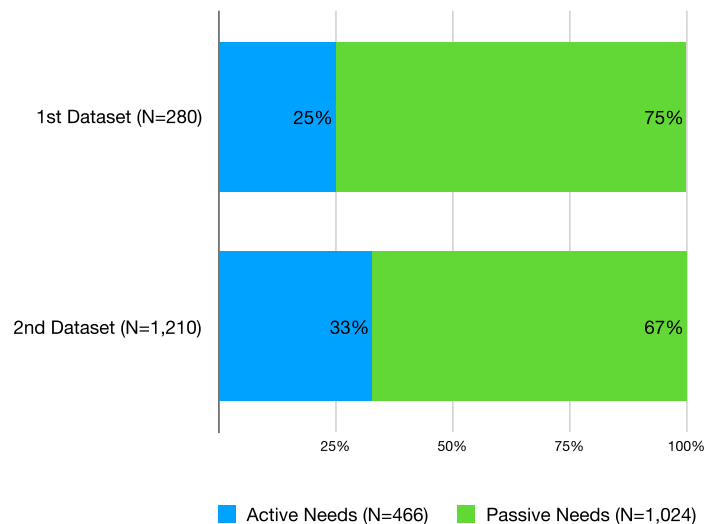


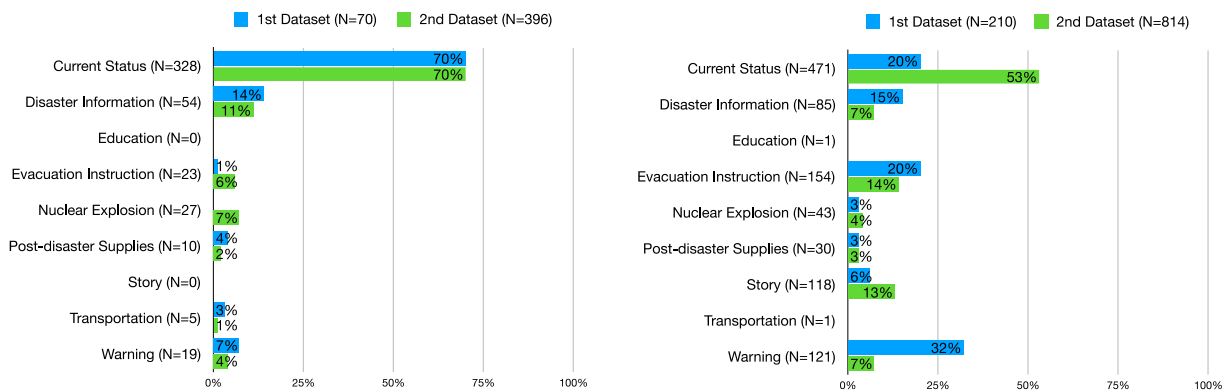
Figure 5.1 Datasets distribution on information needs ($N = 1,490$)

5.2.1 Datasets comparison of active and passive information needs categories

Figure 5.2 shows datasets distribution on active and passive information need categories.

Figure 5.2(a) shows datasets distribution on active need categories with $N = 70$ on the first dataset, and $N = 396$ on the second dataset. A clear common pattern we can observe is the large proportion of the current status category among the two datasets. The proportion of the disaster information being the second largest category was also common in the two datasets. Patterns of remaining categories were found to be varied.

Figure 5.2(b) shows datasets distribution on passive need categories with $N = 210$ on the first dataset, and $N = 814$ on the second dataset. Both the current status category and evacuation instruction category were among the most frequent categories in the two datasets. A noticeable difference was that while the warning category was the most frequent category in the first dataset, the current status category was the most frequent in the second dataset. Also, the disaster information category had a high proportion in the first dataset, while the story category was reasonably high in the second dataset.



(a) Active information needs categories

(b) Passive information needs categories

Figure 5.2 Datasets distribution on active and passive information needs categories

5.2.2 Datasets comparison of information sources and information channels

Figure 5.3 shows datasets distribution on information sources and information channels. The sample size of information sources was $N = 240$ for the first dataset and $N = 688$ for the second dataset, and that of information channels was $N = 241$ for the first dataset and $N = 677$ for the second dataset, respectively.

As for the comparison of information sources, Figure 5.3(a) shows the most frequent category, family/neighbourhood, was found to be common between the two datasets. This time, they are 41% and 49% in the first dataset and second dataset, respectively, and thus, the balance to the rest of the categories was also similar. However, we also observed some differences. For example, the broadcast media category was the second frequent category in the first dataset while the work community/colleagues were the second category in the second dataset.

As for the comparison of information channels, Figure 5.3 (b) shows the face to face communication being the most frequent category is found to be common among the datasets. The balance between the face to face category and other categories was different between the datasets. In the first dataset, the face to face category remained at 38% while the second dataset reached to 77%. For the rest of categories, no clear pattern of similarity or difference was observed between the datasets.

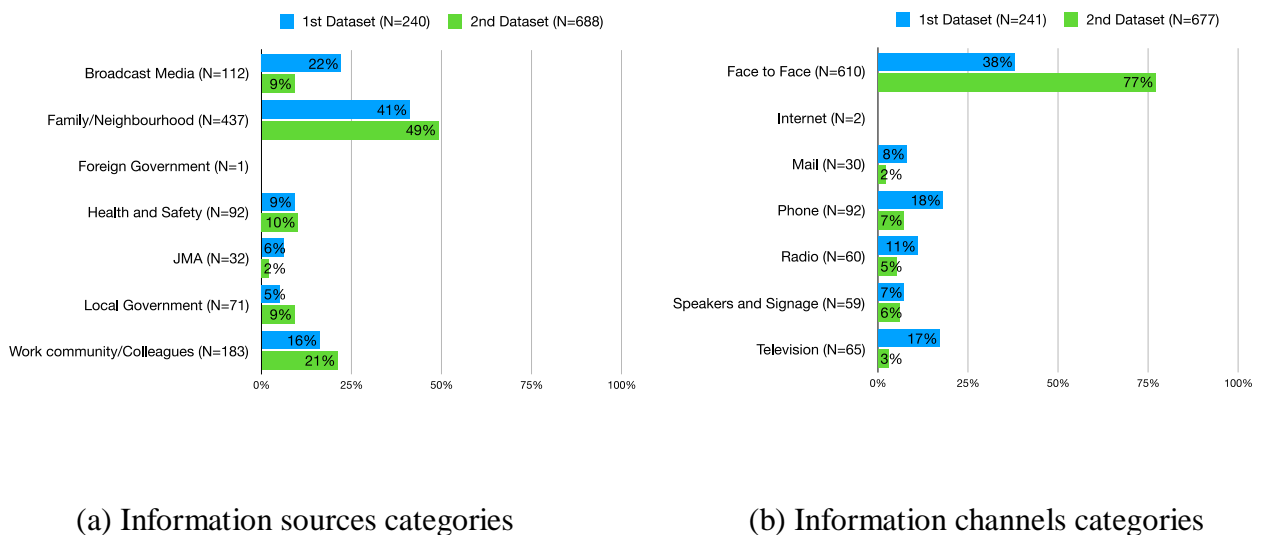


Figure 5.3 Datasets distribution on information channels and information sources categories

5.3 Summary

This additional chapter examined the impact of two datasets on annotations by qualitatively comparing the distribution pattern.

Our findings show the annotation patterns on the two datasets were not identical. However, we observed many cases where two datasets showed a similar pattern in annotated data. This includes the proportion of active and passive information needs, and the most frequent category in active information needs, information sources, and information channels. On the other hand, the category distribution of passive information needs showed more variance than other variables. Also, it was unlikely to find very similar patterns in less frequently occurring categories in general.

The above findings also highlight the importance of examining people's testimonies from multiple datasets or collections in the investigation of ISB, when possible.

Chapter 6

Conclusion and Future Work

6.1 Discussion

This thesis aims to improve our understanding of disaster-related information seeking behaviour (ISB) by providing a detailed description of ISB concepts such as passive and active information needs, information channels, and information sources, and their relationships. This research also investigates the role of two important factors in disaster-related ISB, such as temporal stages of disaster, and human senses.

This section discusses our findings on the modelling of disaster-related ISB by considering similarities and differences from existing studies, the implication on temporal stages of disaster, and human senses within the context of disaster-related ISB.

6.1.1 Disaster-related ISB modelling

Existing literature has been analysed in two major contexts, such as everyday life and work-related (Savolainen, 2008, 2010). However, a limited number of studies have been investigated disaster-related ISB, which is the focus of this thesis as the theoretical contribution in ISB models. Table 6.1 shows the difference of information needs, information sources, and information channels used in everyday life, work-related, and disaster-related ISB.

From ISB model that focuses on everyday life and work-related ISB refers to a set of attributes characterising recurrent qualities of both work and free time activities that most are familiar, ordinary, and routine (Savolainen, 2010). In everyday life ISB, friends, neighbours, and relatives appeared to be popular information sources, and newspapers, the Internet, and television appeared to be popular channels (Savolainen, 2010). The Internet has become a highly popular channel of information; however, the Internet has not been able to replace other channels such as the telephone, television, radio, and newspaper in everyday life ISB. Overall, everyday life ISB seems to draw on familiar information sources and channels that are often used almost routinely.

Table 6.1 ISB instances used in everyday life, work-related, and disaster-related ISB

ISB Instances	Everyday life ISB	Work-related ISB	Disaster-related ISB
Information need	<ul style="list-style-type: none"> • Health • Consumption • Leisure 	<ul style="list-style-type: none"> • News (general news and news about the organisation) • Employee information • Staff contact • Services (i.e., canteen menu, resource booking, time tables and such) 	<ul style="list-style-type: none"> • Current status • Disaster information • Education • Evacuation instruction • Nuclear explosion • Post-disaster supplies • Story • Transportation • Warning
Information sources	<ul style="list-style-type: none"> • Friends • Neighbours • Relatives 	<ul style="list-style-type: none"> • Supervisors • Administrator • Manager • Project leader • Teachers • Technician • Co-workers/colleagues 	<ul style="list-style-type: none"> • Broadcast media • Family/neighbourhood • Foreign government • Health and safety • Japan Meteorological Agency (JMA) • Local government • Work community/colleagues
Information channels	<ul style="list-style-type: none"> • Telephone • Television • Radio • Internet 	<ul style="list-style-type: none"> • Word of mouth • Intranet • Internet 	<ul style="list-style-type: none"> • Face to face • Internet • Mail • Phone • Radio • Speakers and signage • Television

On the other hand, the field of work-related ISB is relatively well-defined and self-explanatory (Miller and Jablin, 1991; Ikoja-Odongo and Mostert, 2006; Stenmark, 2010). Information need found in work-related ISB such as reading news about the organisation and participating in the online discussion are common, followed by employee information, staff contact, and services (e.g., canteen menu, resource booking, time tables, and such) with the most frequently used information sources were internal colleagues (Miller and Jablin, 1991; Stenmark, 2010). Another example within the context of their work environment is in legislative processes for determining parliamentarians' information needs that showed topics on politics, governance, regional and provincial matters and local government were

closely related within the parliamentary hierarchy (Ikoja-Odongo and Mostert, 2006). Further, word of mouth, recourse to personal experience, friends, relatives and workmates, were key information sources (Ikoja-Odongo and Mostert, 2006). Thus, the information sources and channels complement both in everyday life and work-related ISB.

Furthermore, this thesis focuses on disaster-related ISB, which is different from existing ISB model that focuses on everyday life and work-related ISB. We provided a detailed account of disaster-related ISB in the context of a large-scale earthquake and tsunami, the relationship between passive and active information needs, information channels, and information sources (see **Chapter 3**). Our analysis suggests the information needs that people obtained and received are different from their everyday life information, for example, information such as current status about family and surroundings, disaster information, and warning represent some of the common information that people actively seeks. Our analyses also suggest that information channels were frequently used by people, with no particular category being more popular than another, as such information sources were varied, for example, family and neighbourhoods were far more popular information sources than other categories such as broadcast media. Although some of the category's distribution of passive and active information needs, information sources and information channels are smaller than other categories, Table 6.1 indicated the diversity of disaster-related ISB concepts.

Some of our findings are comparable to existing disaster-related studies.

The present study in line with an Australian flood case study, Ryan (2013) indicated that other people such as family, neighbours, and colleagues were either somewhat, very, or the most important sources of information. Our finding also suggests that family and neighbourhood are the most popular information sources, and face-to-face was the most popular channel for both passive and active information needs. Given that the large proportion of information channels was face-to-face communication, and given that other common information channels such as TV, radio, and speakers are mostly one-way communication, the society needs further development of resilient ICT but also two-way communication technologies where local people's messages can be efficiently captured, summarised, and delivered to relevant parties in the community. This implies that effective

disaster management should exchange valuable information between information channels as well as affected people located in different places (Imran et al., 2015).

Our findings also suggest that both types of information needs were obtained or received through a range of information channels and information sources, which is consistent with Gómez (2013)'s findings on international students during the 2011 Great East Japan Earthquake. Although not all studies made a clear distinction between information channels and information sources (e.g., Ryan, 2013; Palen and Liu, 2007; Arai, 2013), and it is true that sometimes the border between information channels and information sources can be ambiguous, we found this distinction useful in understanding disaster-related ISB. One such example is the pattern of the temporal stages, in which we observed that the proportion of information channel categories changed over the stages, while that of information sources did not change drastically.

6.1.2 Implication on temporal stages of disaster

Our findings suggest the importance of considering temporal stages to characterise disaster-related ISB. Studies on disasters and crisis situations have identified the importance of temporal stages (Powell, 1954; Dynes, 1970; Neal, 1997). Gómez (2013), for example, used an extended phase of an emergency during disaster. Gómez (2013) found the continuous phases from taking shelter in Sendai to life in the city during the aftermath went on often unmanaged. The evacuation process and safety confirmation, however, were successful because the students relied on the information that they got from their family and friends of the same nationality.

In our work, four out of eight socio-temporal stages in Powell's model were examined. Examination of other stages is left to future work due to the lack of instances in our dataset. Our findings also show that the evacuation instruction appears in passive information needs, not in active information needs. This means that people are passively receiving or encountering the instruction to evacuate rather than actively seeking it, which support Gómez (2013) work. Nevertheless, our findings provide empirical evidence to demonstrate the impact of temporal stages on information needs and information channels and thus support the importance of examining temporal aspects when considering disaster-related ISB models. On the other hand, a limitation of Powell's temporal stages of the disaster was

identified in the context of our work on ISB. For example, our informants heard a tsunami warning while they were securing a safe place from an earthquake. In such a situation, multiple temporal stages can be applied to an ISB instance. Powell's model does not offer clear guidance for dealing with these circumstances. Therefore, further development is needed to tailor the original temporal stage model to ISB-oriented studies.

6.1.3 The use of human senses on disaster-related ISB

On chapter 4, our findings showed three out of five human senses, such as sight, hearing, and touch was identified from disaster-related people's testimonies. Although the circumstances were different, our findings are in line with a lab-based study of the three senses modalities on human-vehicle interaction (Riener, 2008). The isolated situation, such as driving a vehicle or being trapped in a disaster-situation, leads people used their three senses frequently such as sight, hearing, and touch.

We then examined the relationship between the senses and two modes of information needs, such as active information needs, and passive information needs (see **Figure 4.3**). Our analysis implied to studies about corporeal or embodied information where people's testimonies have signal-based to obtain and to receive information (Bates, 2006; Lloyd, 2009). This resulted in diverse categories among on active information needs and passive information needs where people use the sense of sight more frequently on active information needs than hearing, while people use the sense of hearing more frequently on passive information needs (see **Figure 4.4**). Our analysis suggests the sense pattern of passive and active information needs is more or less the same. For example, information about current status and disaster information can be gained via sight, and information about evacuation instruction is mostly sensed by hearing. Therefore, the modes of information needs (passive and active information needs) are an important factor to understand the use of senses in disaster-related ISB.

Further, the proportion of hearing was often higher than sight in many categories of information sources (e.g., all categories except unspecified category), and information channels (e.g., face to face, phone, speaker and signage, and radio) (see **Figure 4.5**). As for the unspecified categories, we speculate that the high proportion of sight is due to the cases

where information was obtained by the person itself, but further study is needed to validate this.

Furthermore, there were cases where the use of senses was determined by its sources and channels, not by behavioural choice. For example, if the information is distributed through speakers, people have to use their hearing to receive it. Previous studies have suggested that information is actively moving as the attribute of information itself to change the use of senses (Olsson and Lloyd, 2017). Based on this understanding of how information sources and information channels modes were utilised for information gathering; thus, diversifying information sources and information channels for information dissemination (e.g., television) could foster an open environment and convenient ways to produce, share, and consume information and are also important for designing a disaster response program.

Many studies on senses show that the sight was a dominant sense in our daily life (San Roque et al., 2015). However, our result suggests that the proportion of senses can vary across the categories of passive and active information needs, information sources, and information channels in the context of disaster-related ISB. It also supports the importance of investigating the role of the body in ISB domain as suggested by Cox et al. (2017).

We also examined the relationship between the senses and demographic characteristics, such as gender, location, and age, within the context of disaster-related ISB.

As for gender, our results echo the findings of existing studies (Always et al., 1998; Moreno-Walton, and Koenig, 2016; Polderman et al., 2018) in that the proportion of senses was different across gender that males had a higher proportion of sight while females had a higher proportion of hearing than the opposite gender. However, based on Riener (2008) studies on gender-related human-vehicle interaction that stated that females are more aware of their senses of touch did not appear in our findings.

In terms of location, the proportion of senses in the three locations was generally similar. However, in the Miyagi Prefecture, the proportion of sight was larger than the other two prefectures. This might be because Miyagi is situated closer to the epicentre than the Iwate

and Fukushima Prefectures. Or this could be due to the geographic characteristic of the area. Further studies are needed to investigate the effect of location on the use of senses.

In terms of age, we considered Riener's suggestion that better results could be achieved using varied age group categories (Riener, 2008). We then used Erikson's lifespan stages of developmental theory to classify the age categories (Erikson, 1950; Erikson, 1968). Our study results show that as a person ages, the use of sight will decrease, and the use of hearing will increase. However, there is no significant association between the senses based on age in statistical analysis.

6.1.4 Oral document as data collections for examining disaster-related ISB

On chapter 5, additionally, our findings suggest that the nature of datasets and the different approaches taken for studying disaster-related ISB instances on disaster-related ISB of the datasets, thus, influence the findings.

Our findings suggest that oral documents such as written testimonies can be valuable resources for studying disaster-related ISB from a large number of populations, as Turner (2012a); Thatcher et al. (2015) showed. Unlike conventional interviews, we did not have full control over how testimonies were interviewed, recorded, transcribed, and edited for publication. Furthermore, it should be noted that the testimonies were not originally collected for ISB studies, but for a more general purpose of archiving memories of disaster experiences. These limitations should be taken seriously. However, they offer a rich set of concepts that allowed us to gain a detailed account of disaster-related ISB. Most importantly, because they are published works, other researchers can study them to validate, reproduce, or expand upon our findings. This study also offers a case where oral documents (Turner, 2010) can be exploited as a useful source of studying disaster-related ISB.

In addition, the contribution of the thesis suggests that people's written testimonies used can be an alternative source to further analyse disaster-related ISB instances and emerging factors such as temporal stages and human senses. Those testimonies content can be carried out with varied approaches. Thus, we propose the temporal stages of disaster and the human senses as the important factors to consider on the further development disaster-related ISB modelling.

6.2 Limitations

We identified multiple limitations. First, the disaster-related ISB hierarchical codes, instances, and their relationships can be limited to the 2011 Great East Japan Earthquake and Tsunami, and they might not apply to other types of natural disaster (e.g., hurricane (Piotrowski and Armstrong, 1998; O'Connor, 2010), bushfire (Cohen et al., 2007), and flood (Ryan, 2013)). We found that earthquake, tsunami, and nuclear explosion were happening almost simultaneously. Thus, we do not try to isolate each type of disasters in the analysis, and we try to capture and understand the complexity of disaster-related ISB by maintaining the occurrence of multiple disaster types.

Second, we did not have control over the creation or collation of people's testimonies. Testimonies used in our study were collected, transcribed, and edited by journalists and publishers to archive the experiences of affected local people, as opposed to researchers interviewing people to study ISB. Also, a time lag exists between the event and the testimonies. All reports used in our study collected and published testimonies approximately one year after the event. This could affect how people remembered the event and described their experience. In this approach, one cannot avoid people from forgetting over time, and the memory could have been deficient as a result of the time-lag, potentially in the time of a disaster. Nevertheless, Guo and Li (2016), who studied the data collected at a similar time as our data, demonstrated that people who were affected by the 2011 Great East Japan Earthquake and Tsunami was able to recall their past-experience that led to raise public consciousness and motivate appropriate actions. As shown in the result section, our study was also be able to provide a detailed account of disaster-related ISB from testimonies.

Third, the frequency of temporal stages in our study is affected by the timing of the testimonies collected. Our dataset allowed us to collect the data in four out of eight stages in Powell's temporal stages of disaster (Powell, 1954). A limitation of Powell's temporal stages of the disaster was identified that multiple temporal stages can be applied to an ISB instance. Powell's model does not offer clear guidance for dealing with these circumstances. Therefore, further development is needed to tailor the original temporal stage model to ISB-oriented studies.

Fourth, our study employed a content analysis for studying documents and communication artefacts. Another approach, i.e., discourse analysis is open for further discussion to study how language is used between people, both in written and spoken contexts, need to be tried.

Finally, further investigation should be carried out to extend our understanding of the human senses in disaster-related ISB. Analysis of senses during information seeking involves multiple elements such as the perception of stimulation, memory system, and recollection process (DeVito, 2009). Due to the nature of research methodology adapted, however, the findings of this study remain at the level of analysing descriptions of self-recollection and self-reporting, rather than neural responses to stimuli.

6.3 Future work

Recommendations for future work are apparent.

The next step is to expand the sample size by analysing more published testimonies. This will allow us to validate the findings of this study. It will also enable us to examine the effect of geographic location and occupations, which was difficult to perform in the present study due to limited sample size and limited information about the provided testimonies. It would also be important to expand the scope of this research into a disaster-related information behaviour concept; for example, how information use shapes our understanding of decision-making in future natural disaster scenarios.

Another direction would involve cross-examination of our findings with studies based on social network data. This will allow us to gain a more comprehensive understanding of disaster-related ISB between those who had Internet access and those who did not.

Further, future research should explore more about the role of the body and its characteristics, especially within the ISB domain.

Acknowledgement

In my opinion, it is most appropriate to convey our praises and gratitude to God Almighty for infinite mercy and guidance which have inspired us to generate and develop ideas, work and tangible efforts for the improvement of science ultimately that of all mankind.

Disaster-related studies are one of my research commitments. Starting in 2011, I was chosen by Universitas Indonesia to attend the exchange program; however, the program delayed due to the Great East Japan Earthquake and Tsunami. Because of that, I was allowed to research the supporting activities preservation program to fulfil public libraries needs for my undergraduate thesis. At that time, I was honoured to work under the supervision of Professor Shunsaku Tamura at School of Library and Information Science, Faculty of Letters, Keio University.

The journey does not stop there. From 2013 until 2019, I also have an opportunity to continue the master and doctoral program at the Graduate School of Library, Information, and Media Studies, University of Tsukuba. I would like to thank Professor Hideo Joho for allowing me to join Joho Lab (the lab name is Information Seeking and Retrieval (ISR) Laboratory, presently), and also for his patient support, encouragement, and friendly relationship throughout this thesis project. I would like to thank Professor Tetsuya Shirai for his guidance in the early work and for providing a number of unique oral documents, and for the opportunity to present my work with research unit team “Memory Resources” on Natural Disaster Archives in Aceh, Indonesia. Also, I thank Professor Masao Takaku for his comments for publication as well as for this thesis. I really am grateful to have three of you as my supervisors, who make research exciting. I thank examiners, Professor Shinichi Nakayama, and Professor Atsushi Toshimori (Faculty of Library, Information and Media Science, University of Tsukuba), and also Professor Kazuaki Kishida (School of Library and Information Science, Keio University).

I could not survive without financial support during my study; especially I thank the Indonesia Endowment Fund for Education (LPDP) for providing allowances. I also thank the 2016 iFellows Doctoral Fellowship sponsored by the iSchools Consortium and

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As always, I really am grateful to all the support and understanding from the lovely members of my family; really am thanking my family for giving me complete freedom, trust, and prayer to study abroad, for Ummi, Papa, Rahma, Akbar, Ica, Habib, as well as my nephew, Zaza-chan.

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I thank all the volunteer activities' providers during my study. Without contributing a mere speck, my life could be meaningless, I thank Overseas Indonesian Students Association Alliance (PPI Dunia) and in Ibaraki (PPI Ibaraki); OISAA's Radio; Ibaraki International Ambassador of Ibaraki International Association; ajarbelajar.com; ASIS&T; CILIP; and Kappa Sigma Kappa Indonesia (KSKI).

My thanks also go to all of my friends that I cannot mention their names one by one, I love them all.

From February 2019, I have been starting to work as a lecturer at the Department of Library and Information Science, Universitas Indonesia. I commit that I should be a part of the change in LIS Field, especially for contributing to disaster-related information behaviour domain.

During my study years, I was slightly daunted because those very personal stories were so horrific and full of such unimaginable sufferings, making me feel very inadequately qualified to do the analysis. Also, never having experienced myself a natural disaster of such proportions and terror, I think I ought to offer my sincere apologies for any misinterpretation and misunderstanding that I am sure I am guilty of making. What the survivors had experienced was truly beyond my comprehension and imagination. Despite those shortcomings, it is my sincere hope and wishes that the thesis of "**A Study of**

Temporal Stages and Human Senses in Information Seeking Behaviour of the Great East Japan Earthquake and Tsunami” will be widely read to provide a valuable and perhaps also an inspiring lesson for the readers, and for future generation.

The devastating natural calamity that occurred and killed thousands of people in Japan in 2011 will no doubt be always remembered and referred to by future generations. Similarly, the sufferings and losses, as well as the resilience, courage and optimism of the survivors, will undoubtedly be always remembered. For the thousands who did not make it, let us bow our heads and pray for their souls to rest in peace with the Almighty.

List of References

- Alway, J., Belgrave, L. L., and Smith, K. J. (1998). Back to normal: Gender and disaster. *Symbolic Interaction*, 21(2), 175-195.
- American Red Cross. (2011). Social Media in Disasters and Emergencies. American Red Cross: Washington.
- Arai, K. (2013). How to transmit disaster information effectively: A linguistic perspective on Japan's tsunami warnings and evacuation instructions. *International journal of disaster risk science*, 4(3), 150-158.
- Balatsoukas, P., and Ruthven, I. (2012). An eye-tracking approach to the analysis of relevance judgments on the Web: The case of Google search engine. *Journal of the American Society for Information Science and Technology*, 63(9), 1728-1746.
- Bates, B., Harmon, M., Wells, S., and Gee, C. (2006). Katrina and the Waves: College Student News Information Seeking at times of Prolonged Disaster Coverage. *Midwest Association of Public Opinion Research*.
- Bates, M. J. (2006). Fundamental forms of information. *Journal of the American society for information science and technology*, 57(8), 1033-1045.
- Beasley, T. M., & Schumacker, R. E. (1995). Multiple regression approach to analyzing contingency tables: Post hoc and planned comparison procedures. *The Journal of Experimental Education*, 64(1), 79-93.
- Britton, N. (1988). Organized behavior in disaster: A review essay. *International Journal of Mass Emergencies and Disasters*, 6(3), 363-395.
- Case, Donald O. (2007). *Looking for information: A survey of research on information seeking, needs, and behavior*. Emerald Group Publishing.
- Castillo, C. (2016). *Big crisis data: Social media in disasters and time-critical situations*. Cambridge University Press.
- Charmaz, K. (2014). *Constructing grounded theory*. Sage.
- Cho, S. E., Jung, K., and Park, H. W. (2013). Social media use during Japan's 2011 earthquake: how Twitter transforms the locus of crisis communication. *Media International Australia*, 149(1), 28-40.
- Clemens, R. G., and Cushing, A. L. (2010, October). Beyond everyday life: Information seeking behavior in deeply meaningful and profoundly personal contexts. In *Proceedings of the 73rd ASIS&T Annual Meeting on Navigating Streams in an Information Ecosystem-Volume 47* (p. 62). American Society for Information Science.
- Cohen, E., Hughes, P., and White, P. B. (2007). Media and bushfires: A community perspective of the media during the Grampians Fires 2006. *Environmental Hazards*, 7(2), 88-96.
- Cox, A. M., Griffin, B., and Hartel, J. (2017). What everybody knows: embodied information in serious leisure. *Journal of Documentation*, 73(3), 386-406.
- Coyle, D., and Meier, P. (2009). New technologies in emergencies and conflicts: the role of information and social networks.

- Dervin, B. (1983). *An overview of sense-making research: Concepts, methods, and results to date*. The Author.
- DeVito, J. A. (2012). *The interpersonal communication book*. Pearson Higher Ed.
- Dynes, R. R. (1970). *Organized behavior in disaster*. Heath Lexington Books.
- Erikson, E. (1968). *Youth: Identity and crisis*. New York, NY: WW.
- Erikson, E. H. (1950). *Childhood and society*. WW Norton and Company.
- Field, A. (2009). *Discovering statistics using SPSS*. Sage publications.
- Frohmann, B. (2004). Documentation redux: prolegomenon to (another) philosophy of information.
- Fu, K. W., White, J., Chan, Y. Y., Zhou, L., Zhang, Q., and Lu, Q. (2010). Enabling the disabled: media use and communication needs of people with disabilities during and after the Sichuan earthquake in China. *International Journal of Emergency Management*, 7(1), 75-87.
- Garcia-Perez, M. A., & Nunez-Anton, V. (2003). Cellwise residual analysis in two-way contingency tables. *Educational and psychological measurement*, 63(5), 825-839.
- Gómez, O. A. (2013). Lessons from international students' reaction to the 2011 Great East Japan Earthquake: the case of the School of Engineering at Tohoku University. *International Journal of Disaster Risk Science*, 4(3), 137-149.
- Greenberg, B. S., Hofschire, L., and Lachlan, K. (2002). Diffusion, media use and interpersonal communication behaviors. *Communication and terrorism*, 3-16.
- Guo, Y., and Li, Y. (2016). Getting ready for mega disasters: the role of past experience in changing disaster consciousness. *Disaster Prevention and Management*, 25(4), 492-505.
- Hagar, C. (2010). Farmers' search for information during the UK foot-and-mouth disease crisis-what can we learn?. *Australian Journal of Emergency Management*, 25(4), 38.
- Hewitt, K. (1983). Interpretations of calamity from the viewpoint of human ecology.
- Hou, L., and Shi, P. (2011). Haiti 2010 earthquake—How to explain such huge losses?. *International journal of disaster risk science*, 2(1), 25-33.
- Howe, J. (2006). The rise of crowdsourcing. *Wired magazine*, 14(6), 1-4.
- Howes, D. (Ed.). (2018). *Senses and Sensation: Critical and Primary Sources*. Bloomsbury Academic, Bloomsbury Publishing.
- Hsieh, H. F., and Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative health research*, 15(9), 1277-1288.
- Ikoja-Odongo, R., & Mostert, J. (2006). Information seeking behaviour: a conceptual framework. *South African journal of libraries and information science*, 72(3), 145-158.
- Imran, M., Castillo, C., Diaz, F., and Vieweg, S. (2015). Processing social media messages in mass emergency: A survey. *ACM Computing Surveys (CSUR)*, 47(4), 67.
- Imran, M., Castillo, C., Lucas, J., Meier, P., and Vieweg, S. (2014, April). AIDR: Artificial intelligence for disaster response. In *Proceedings of the 23rd International Conference on World Wide Web* (pp. 159-162). ACM.

- Imran, M., Elbassuoni, S., Castillo, C., Diaz, F., and Meier, P. (2013, May). Practical extraction of disaster-relevant information from social media. In *Proceedings of the 22nd International Conference on World Wide Web* (pp. 1021-1024). ACM.
- Ingwersen, P., and Järvelin, K. (2006). *The turn: Integration of information seeking and retrieval in context* (Vol. 18). Springer Science and Business Media.
- Jenkins, A., Croitoru, A., Crooks, A. T., and Stefanidis, A. (2016). Crowdsourcing a collective sense of place. *PloS one*, 11(4), e0152932.
- Joho, H., Jatowt, A., and Blanco, R. (2015). Temporal information searching behaviour and strategies. *Information Processing & Management*, 51(6), 834-850.
- Krippendorff, K. (2018). *Content analysis: An introduction to its methodology*. Sage publications.
- Lachlan, K., Spence, P., and Nelson, L. (2008). Age, gender and information seeking. *National Communication Association: San Diego, CA, USA*.
- Lloyd, A. (2009). Informing practice: information experiences of ambulance officers in training and on-road practice. *Journal of documentation*, 65(3), 396-419.
- Marchionini, G., and White, R. (2007). Find what you need, understand what you find. *International Journal of Human-Computer Interaction*, 23(3), 205-237.
- McKenzie, P. J. (2003). A model of information practices in accounts of everyday-life information seeking. *Journal of documentation*, 59(1), 19-40.
- Mendoza, M., Poblete, B., and Castillo, C. (2010, July). Twitter under crisis: Can we trust what we RT?. In *Proceedings of the first workshop on social media analytics* (pp. 71-79). ACM.
- Miller, V. D., & Jablin, F. M. (1991). Information seeking during organizational entry: Influences, tactics, and a model of the process. *Academy of Management Review*, 16(1), 92-120.
- Moreno-Walton, L., and Koenig, K. (2016). Disaster resilience: addressing gender disparities. *World Medical & Health Policy*, 8(1), 46-57.
- Morgan, D. L. (1993). Qualitative content analysis: a guide to paths not taken. *Qualitative health research*, 3(1), 112-121.
- National Science and Technology Council. (2005). Grand challenges for disaster reduction: A report of the subcommittee on disaster reduction.
- Neal, D. M. (1997). Reconsidering the phases of disasters. *International Journal of Mass Emergencies and Disasters*, 15(2), 239-264.
- NHK 東日本大震災プロジェクト. (2013). “証言記録東日本大震災”. NHK 出版.
- NHK 東日本大震災プロジェクト. (2014). “証言記録東日本大震災 II”. NHK 出版.
- NHK 東日本大震災プロジェクト. (2015). “証言記録東日本大震災 III”. NHK 出版.
- Nyberg, L., Bäckman, L., Erngrund, K., Olofsson, U., and Nilsson, L. G. (1996). Age differences in episodic memory, semantic memory, and priming: Relationships to demographic, intellectual, and biological factors. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 51(4), P234-P240.

- O'Connor, B. (2010). *The Situational Small World of a Post-disaster Community: Insights Into Information Behaviors After the Devastation of Hurricane Katrina in Slidell, Louisiana* (Doctoral dissertation, University of North Texas).
- Olsson, M., and Lloyd, A. (2017). Being in place: embodied information practices.
- Olteanu, A., Vieweg, S., and Castillo, C. (2015, February). What to expect when the unexpected happens: Social media communications across crises. In *Proceedings of the 18th ACM conference on computer supported cooperative work & social computing* (pp. 994-1009). ACM.
- Palen, L., and Anderson, K. M. (2016). Crisis informatics—New data for extraordinary times. *Science*, 353(6296), 224-225.
- Palen, L., and Liu, S. B. (2007, April). Citizen communications in crisis: anticipating a future of ICT-supported public participation. In *Proceedings of the SIGCHI conference on Human factors in computing systems* (pp. 727-736). ACM.
- Peter Lueg, C. (2014). Characteristics of human perception and their relevance when studying information behavior. *Journal of Documentation*, 70(4), 562-574.
- Piotrowski, C., and Armstrong, T. R. (1998). Mass media preferences in disaster: A study of Hurricane Danny. *Social Behavior and Personality: an international journal*, 26(4), 341-345.
- Plummer, K. (2001). *Documents of life 2: An invitation to a critical humanism* (Vol. 2). Sage.
- Polderman, T. J., Kreukels, B. P., Irwig, M. S., Beach, L., Chan, Y. M., Derks, E. M., ... & Raynor, L. (2018). The biological contributions to gender identity and gender diversity: Bringing data to the table. *Behavior genetics*, 48(2), 95-108.
- Powell, J. W. (1954). An introduction to the natural history of disaster. *Univ. of Maryland: Disaster Research Project*.
- Taylor, K., Priest, S., Sisco, H. F., Banning, S., and Campbell, K. (2009). Reading Hurricane Katrina: Information sources and decision-making in response to a natural disaster. *Social Epistemology*, 23(3-4), 361-380.
- Quarantelli, E. L. (1987). The social science study of disasters and mass communications.
- Quarantelli, E. L. (1997). Ten criteria for evaluating the management of community disasters. *Disasters*, 21(1), 39-56.
- Riener, A. (2008). Age- and Gender-Related Studies on Senses of Perception for Human-Vehicle-Interaction. In *Workshop Proceedings der Tagungen Mensch & Computer 2008, DeLFI 2008 und Cognitive Design 2008*. Logos Verlag.
- Robinson, L. (2015). Multisensory, pervasive, immersive: Towards a new generation of documents. *Journal of the Association for information science and technology*, 66(8), 1734-1737.
- Roeser, J., and Schaefer, G. (2002). Media use in Germany around the attacks in the United States. *Communication and terrorism. Public and media responses to*, 9(11), 85-97.
- Rogers, E. M. (1995). Diffusion of Innovations: modifications of a model for telecommunications. In *Die diffusion von innovationen in der telekommunikation* (pp. 25-38). Springer, Berlin, Heidelberg.

- Rosenthal, U., Charles, M. T., and Hart, P. T. (Eds.). (1989). *Coping with crises: The management of disasters, riots, and terrorism*. Charles C Thomas Pub Limited.
- Ryan, B. (2013). Information seeking in a flood. *Disaster Prevention and Management: An International Journal*, 22(3), 229-242.
- Ryan, B. (2016). Developing an understanding of information seeking during the impact phase of a natural disaster (Doctoral dissertation). Retrieved from RMIT Research Repository <http://researchbank.rmit.edu.au/eserv/rmit:162001/Ryan.pdf>
- San Roque, L., Kendrick, K. H., Norcliffe, E., Brown, P., Defina, R., Dingemanse, M., ... & Rossi, G. (2015). Vision verbs dominate in conversation across cultures, but the ranking of non-visual verbs varies.
- Savolainen, R. (2008). Source preferences in the context of seeking problem-specific information. *Information Processing & Management*, 44(1), 274-293.
- Savolainen, R. (2010). Everyday life information seeking. *Encyclopedia of Library and Information Sciences*, Third Edition, 1: 1, 2735-2746.
- Seeger, M. W., Vennette, S., Ulmer, R. R., and Sellnow, T. L. (2002). Media use, information seeking and reported needs in post crisis contexts. *Communication and terrorism*, 53-63.
- Shiga, S., Joho, H., Blanco, R., Trippas, J. R., and Sanderson, M. (2017, August). Modelling information needs in collaborative search conversations. In *Proceedings of the 40th International ACM SIGIR Conference on Research and Development in Information Retrieval* (pp. 715-724). ACM.
- Shilling, C. (2012). *The body and social theory*. Sage.
- Singh, V. K., Shah, C., Gwizdka, J., Joho, H., and Gurrin, C. (2017). From sensors to sense-making: Opportunities and challenges for information science. *Proceedings of the Association for Information Science and Technology*, 54(1), 599-602.
- Sonnenwald, D. H. (1999). Evolving perspectives of human information behavior: Contexts, situations, social networks and information horizons. In *Exploring the contexts of information behavior: Proceedings of the Second International Conference in Information Needs*. Taylor Graham.
- Spence, P. R., Westerman, D., Skalski, P. D., Seeger, M., Sellnow, T. L., and Ulmer, R. R. (2006). Gender and age effects on information-seeking after 9/11. *Communication Research Reports*, 23(3), 217-223.
- Stempel III, G. H., and Hargrove, T. (2002). Media sources of information and attitudes about terrorism. *Communication and terrorism: Public and media responses to*, 9(11), 3-16.
- Stenmark, D. (2010, August). Information Seeking in Organisations: A Comparative Survey of Intranet Usage. In *AMCIS* (p. 87).
- Stern, E., and Sundelius, B. (2002). Crisis management Europe: An integrated regional research and training program. *International Studies Perspectives*, 3(1), 71-88.
- Stoddard, E. R. (1968). *Conceptual models of human behavior in disaster*. Texas Western Press.

- Tapia, A. H., Bajpai, K., Jansen, B. J., Yen, J., and Giles, L. (2011, May). Seeking the trustworthy tweet: Can microblogged data fit the information needs of disaster response and humanitarian relief organizations. In *Proceedings of the 8th International ISCRAM Conference* (pp. 1-10). Lisbon, Portugal: ISCRAM.
- Thatcher, A., Vasconcelos, A. C., and Ellis, D. (2015). An investigation into the impact of information behaviour on information failure: The Fukushima Daiichi nuclear power disaster. *International Journal of Information Management*, 35(1), 57-63.
- Towey, A. (1999). Johansen (TK) Aristotle on the Sense-organs. Cambridge UP, 1998. Pp. xvi+ 304.£ 37.50. 052158338. *The Journal of Hellenic Studies*, 119, 192-193.
- Turner, D. (2010). Orally-based information. *Journal of Documentation*, 66(3), 370-383.
- Turner, D. (2012a). Oral documents in concept and in situ, part I: Grounding an exploration of orality and information behavior. *Journal of Documentation*, 68(6), 852-863.
- Turner, D. (2012b). Oral documents in concept and in situ, part II: managerial decrees. *Journal of Documentation*, 68(6), 864-881.
- Wilson, T. D. (2000). Human information behavior. *Informing science*, 3(2), 49-56.
- Yamamoto, E. (2000). Possibilities of Oral History in Japan--Its Present and Future. *眉山女学園大学研究論集 社会科学篇*, (31), 39-48.
- Yuen, M. C., King, I., and Leung, K. S. (2011, October). A survey of crowdsourcing systems. In *2011 IEEE Third International Conference on Privacy, Security, Risk and Trust and 2011 IEEE Third International Conference on Social Computing* (pp. 766-773). IEEE.

List of Research Achievements

This thesis contains a revised version of the materials that have been published elsewhere in the following publications, and please note that some of the content included in this dissertation is found verbatim in these publications.

Publications

- Rahmi, R., Joho, H., and Shirai, T. (2018). An analysis of natural disaster-related information-seeking behavior using temporal stages. *Journal of the Association for Information Science and Technology*
- Rahmi, R. (2019). The Use of Sight, Hearing, and Touch on Information-seeking Behaviour of the Great East Japan Earthquake. *Journal of Information and Media Studies*

Grants

2017 Awarded a 2016 iFellows Doctoral Fellowship. iFellows program is sponsored by the iSchools Consortium and administered by the University of Pittsburgh.

Lectures and presentations

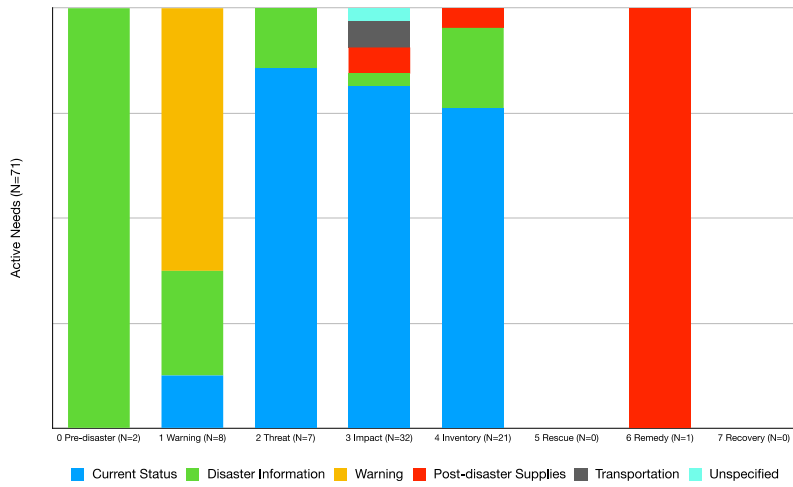
- 2019 Lokakarya Ilmiah Nasional: Filosofi Kajian Informasi dan Budaya, 8-9 August 2019, Universitas Indonesia, Depok, Indonesia
Resource Person
- 2019 Short Course on Big Data for Library Management and Services, 9-11 April 2019, Universitas Indonesia, Depok, Indonesia
Resource Person
- 2019 Seminar Nasional UPIBOOKPEDIA 4.0, 21-22 March 2019, Universitas Pendidikan Indonesia, Bandung, Indonesia
Plenary Speaker
- 2019 International Symposium “Preserving and Using Disasters Archives: Linking Japanese and Indonesian Experiences,” 4 March 2019, Syiah Kuala University, Banda Aceh, Indonesia
Plenary Speaker
- 2018 The 2nd International Conference on Library, Archives, and Information Sciences – (ICOLAIS), 29-30 October 2018 at Universitas Indonesia, Depok, Indonesia
Plenary Speaker <https://icolais.ui.ac.id/speakers/>

- 2018 The 11th Aceh International Workshop and Expo on Sustainable Tsunami Disaster Recovery (AIWEST-DR), 10-12 October 2018, Banda Aceh, Indonesia
Participant <http://aiwest-dr.unsyiah.ac.id/2018/>
- 2018 iConference 2018, 25-28 March 2018 at The University of Sheffield, Sheffield, UK
Participant <https://ischools.org/the-iconeference/about-the-iconeference/iconeference-2018-summary/>
- 2017 The 3rd Asian Summer School in Information Access (ASSIA), 2-5 August 2017, Kyoto, Japan
Poster presenter <http://goassia.github.io/assia2017/>
- 2017 BOBCATSSS 2017 at University of Tampere, Finland. Title: “Understanding Disaster Related Information Seeking Behavior Using Oral Documents”
Full paper presenter <http://bobcatsss2017.com/program/>
- 2016 ISIC: The Information Behavior Conference at University of Zadar, Croatia
Doctoral consortium participant <http://isic2016.com/?lang=en>
- 2016 World Information Architecture Day – Depok, Indonesia. Title: “Search User Interface”
Guest Speaker <http://2016.worldiaday.org/location/depok-indonesia>

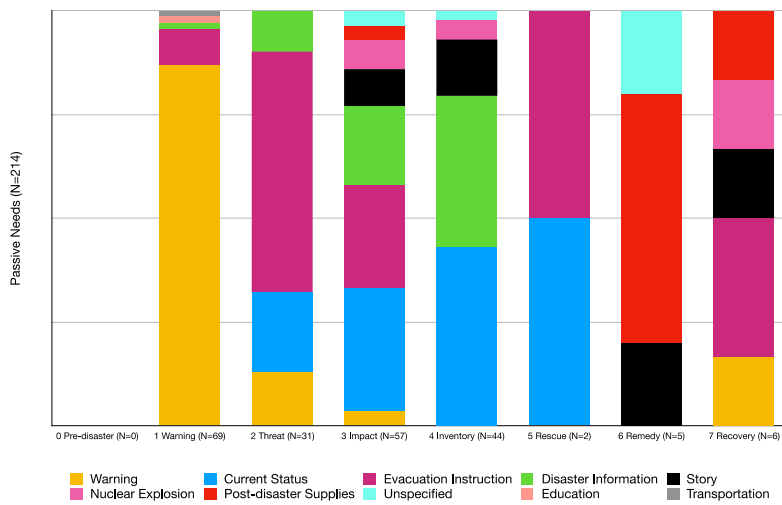
Appendixes

Appendix A:

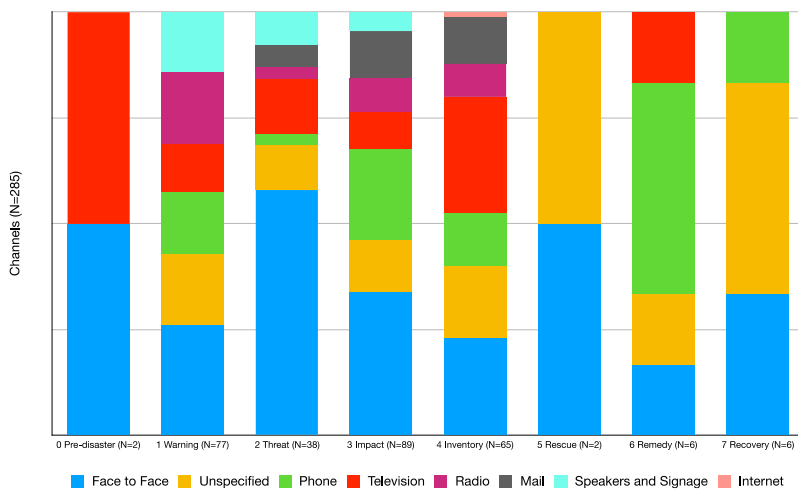
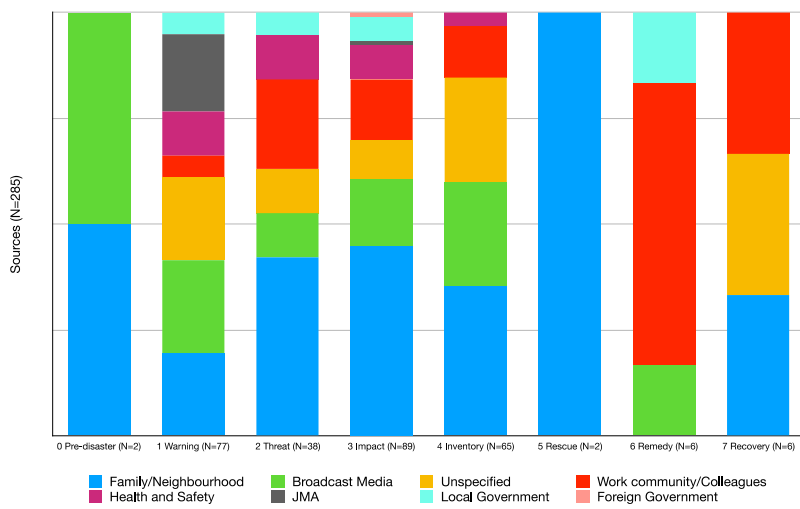
Relationship between temporal stages and information needs



(a) Active Information Needs



(b) Passive Information Needs



Appendix B:

Screening tasks instruction on human senses and disaster-related ISB to crowd workers

This screening tasks instruction on human senses and disaster-related information-seeking behaviour was given to crowdsourcing workers presented in Chapter 4.

1. Screening task instruction on human senses

【簡単】体験談文章への五感ラベル付与作業

<概要>

本タスクでは、東日本大震災アーカイブなどで一般公開されている震災体験談を参考にして作成された文章を、あるルールに従って分類していただきます。具体的には、各文章に対して人間の五感を使った記述が含まれているかを判断していただきます。

今回分類していただく五感は、視覚、聴覚、味覚、嗅覚および触覚です。それぞれの定義と該当する例文をよく読んで、その特徴を理解した上でタスクを実施してください。また、一つの文章で1つ以上の感覚が該当する場合は、複数の選択肢を選択することができます。

1. 視覚は見るものの力または能力のことである；見えるものまたは見られるもの。

例：「パッと見たら、波が立って来たんですよ。」

2. 聴覚は音を知覚する能力である。

例：「そのうち瓦が、ガチャガチャと落ちてくる。」

3. 味覚は物質と口または喉との接触時に感知される風味の感覚である。

例：「このバターはすっぱい味がする。」

4. 嗅覚は鼻の器官によって匂いや香りを感じる能力である。

例：「ちょっとにおいの臭いもの。」

5. 触覚は身体の一部が何かに触れる行為である。

例：「波に、私が乗っかっちゃったっていう感じだと思うんですよ。」

6. なし

<データ取得の目的・取り扱い>

災害関連の情報行動に関する研究に用います。

調査やデータ分析にはすべて匿名 ID を使用いたします。

今回のデータを基にして論文や学会などで研究発表を行うことがあります。

2. Screening task instruction on information channels

【簡単】体験談文章への情報入手経路ラベル付与作業

〈概要〉

本タスクでは、東日本大震災アーカイブなどで一般公開されている震災体験談を参考にして作成された文章を、あるルールに従って分類していただきます。具体的には、各文章に対して情報入手経路に関する情報が含まれているかを判断していただきます。

情報入手経路とは、人々が情報入手する際に使われたメディアや機器のことです。対面での口頭コミュニケーションも入手経路に含まれます。それぞれの情報入手経路の定義と該当する例文をよく読んで、その特徴を理解した上でタスクを実施してください。また、一つの文章で1つ以上の経路が該当すると考えられる場合においても、最も適切と考えられる経路を一つだけお選びください。

情報入手経路1: 対面での口頭 (例: 人々の声、指示)

例: 「町内会の方から、津波が家まで到達する恐れがある、と言われたので、自宅に戻った。」

情報入手経路2: インターネット (例: SNS、ウェブサイト)

例: 「ウェブページ等で可能な限り情報を集めて、安全がある程度確認できたので、帰宅させることにした。」

情報入手経路3: Eメール (例: パソコンや携帯のEメールやメッセージ)

例: 「途中で知人から、自宅近辺まで津波が来ているらしいとのメールが届きました。」

情報入手経路4: 電話 (例: 固定電話、携帯電話、公衆電話)

例: 「家族に電話をして近況を尋ねました。」

情報入手経路5: ラジオ (例: ラジオ、携帯電話ラジオ、カーラジオ、無線ラジオ)

例: 「会社から提供された車のカーラジオから情報を収集しました。」

情報入手経路6: スピーカーと看板 (例: 救急車、消防車、都市広報車、ヘリコプター、オフィススピーカー、警察車両、居住者、学校放送、電子掲示板)

例: 「国道を走る消防車から大津波警報のアナウンスが聞こえてきました。」

情報入手経路7: テレビ (自宅テレビ、携帯テレビ、車載テレビ)

例: 「船の中のテレビから情報を得ることができました。」

情報入手経路8: 経路なし (情報入手経路の記述なし)

例: 「福島市で震度6弱とのことであった。」

〈データ取得の目的・取り扱い〉

- ・災害関連の情報行動に関する研究に用います。
- ・調査やデータ分析にはすべて匿名IDを使用いたします。
- ・今回のデータを基にして論文や学会などで研究発表を行うことがあります。

3. Screening task instruction on passive information needs

【簡単】体験談文章への情報ニーズ（受動的）ラベル付与作業

〈概要〉

本タスクでは、東日本大震災アーカイブなどで一般公開されている震災体験談を参考にして作成された文章を、あるルールに従って分類していただきます。具体的には、各文章に対して「情報ニーズ」と呼ばれる記述が含まれているかを判断していただきます。

情報ニーズには、積極的に情報を求める「能動的」情報ニーズと、向こうからやってきた情報が求めていたものと一致する「受動的」情報ニーズがあります。今回のタスクでは、後者の受動的情報ニーズの記述の有無を判断していただき、その内容を分類していただきます。また、一つの文章で1つ以上のカテゴリが該当すると考えられる場合においても、最も適切と考えられるカテゴリを一つだけお選びください。

注意事項：下記のカテゴリは、あくまで受動的に情報を受け取った場合の記述に適用するカテゴリです。自ら能動的に情報を求めた場合の記述は、すべて「ニーズ8：ニーズなし」に該当しますので、ご注意ください。

ニーズ1：現状（地域の被害状況、地域、県、国の状況）

例：「港の被害状況を聞いて、自宅近辺との被害規模の違いに驚きました。」

ニーズ2：災害情報（災害情報、損害情報、災害準備情報、地震情報、津波情報）

例：「その時石巻で津波の第1波がきて、高さが数十センチだったと聞きました。」

ニーズ3：避難指示（避難指示と避難所の検索）

例：「帰宅が困難な場合は保育園に引き返し泊まるように指示されました。」

ニーズ4：原子力事故（発電所における爆発など）

例：「ラジオから福島第一原発が津波で被災し、爆発したとのニュースが流れました。」

ニーズ5：災害後の供給（ガソリン、水、食料、衣類の提供）

例：「ボランティアの皆さんが避難者用の食べ物を用意してくれるとの連絡がありました。」

ニーズ6：他者の体験談（他者の身に起こった出来事や他者から聞かされた体験）

例：「避難してきた近所の方から自宅が津波で浸水したことをききました。」

ニーズ7：警告（地震速報、津波警報）

例：「国道を走る消防車から大津波警報のアナウンスがありました。」

ニーズ8：ニーズなし（情報ニーズの記述なし、能動的情報ニーズの記述）

例：「（父親に）いくらお金かかってもいいです。」

〈データ取得の目的・取り扱い〉

- ・災害関連の情報行動に関する研究に用います。
- ・調査やデータ分析にはすべて匿名IDを使用いたします。
- ・今回のデータを基にして論文や学会などで研究発表を行うことがあります。

4. Screening task instruction on information sources

【簡単】体験談文章への情報源ラベル付与作業

〈概要〉

本タスクでは、東日本大震災アーカイブなどで一般公開されている震災体験談を参考にして作成された文章を、あるルールに従って分類していただきます。具体的には、各文章に対して情報源に関する記述が含まれているかを判断していただきます。

情報源とは、入手した（あるいは入手しようとした）情報の提供元や発生源のことです。それぞれの情報源の定義と該当する例文をよく読んで、その特徴を理解した上でタスクを実施してください。また、一つの文章で1つ以上の情報源が該当すると考えられる場合においても、最も適切と考えられる情報源を一つだけお選びください。意図した情報が入手できなかった場合でも、入手しようとした情報源を選択してください。

情報源1：放送メディア（映画、ラジオ、録音された音楽、テレビなどの媒体を介して情報を提供する。）

例：「テレビをつけると、私の目に映ったのは、信じられない光景でした。」

情報源2：家族/知人（家族、知人、ご近所やたまたま居合わせた誰か）

例：「帰宅してきた近所の児童が「道路が割れてる！」と言いました。」

情報源3：外国政府

例：「オーストラリア政府から半径80km圏内から避難するように指示がありました。」

情報源4：安全衛生・保安防災組織（救急車、消防隊、支援ボランティア団体、保健所、警察）

例：「津波の発生を知らせる消防車のサイレンとアナウンスが流れた。」

情報源5：気象庁

例：「携帯電話で津波警報を知りました。」

情報源6：地方自治体（市役所職員、地区役員、県庁、広報、支援センター）

例：「携帯と公衆電話で市対策本部と連絡を取りながら救援貸の状況を確認しました。」

情報源7：職場のコミュニティ/同僚（組合、同僚、店員、客、親または保護者、教育機関の学生、教師、役員）

例：「帰宅が無理な場合は保育園に引き返すように理事長から指示されました。」

情報源8：情報源なし

例：「福島市で震度6弱とのことであった。」

〈データ取得の目的・取り扱い〉

- ・災害関連の情報行動に関する研究に用います。
- ・調査やデータ分析にはすべて匿名IDを使用いたします。
- ・今回のデータを基にして論文や学会などで研究発表を行うことがあります。

5. Screening task instruction on active information needs

【簡単】体験談文章への情報ニーズ（能動的）ラベル付与作業

<概要>

本タスクでは、東日本大震災アーカイブなどで一般公開されている震災体験談を参考にして作成された文章を、あるルールに従って分類していただきます。具体的には、各文章に対して「情報ニーズ」と呼ばれる記述が含まれているかを判断していただきます。

情報ニーズは、積極的に情報を求める「能動的」情報ニーズと、向こうからやってきた情報が求めていたものと一致する「受動的」情報ニーズがあります。自ら情報を提供する行為は情報ニーズに当てはまりません。今回のタスクでは、前者の能動的情報ニーズの記述の有無を判断していただき、求めた情報の内容を分類していただきます。実際に情報を得ることができたか否かは問いませんので、ご注意ください。また、一つの文章で1つ以上のカテゴリが該当すると考えられる場合においても、最も適切と考えられるカテゴリを一つだけお選びください。

注意事項：下記のカテゴリは、あくまで自ら能動的に情報を求めた場合の記述に適用するカテゴリです。受動的に情報を受け取った場合の記述は、すべて「ニーズ8：能動的ニーズなし」に該当しますので、ご注意ください。

ニーズ1：現状（家族や知り合いの状況、周りの状況）

例：「途中、平潟に住む家族に連絡しても電話は、繋がらなかった。」

ニーズ2：災害情報（損害情報、災害準備情報、地震情報）

例：「支所内に戻り震度6弱とを確認した。」

ニーズ3：避難指示（避難指示と避難所の検索、避難場所に関する情報）

例：「車で避難しようとしていた男性に「どこへ行けばいいかわからないので、教えてください」と尋ねました。」

ニーズ4：原子力事故（発電所における爆発、放射線に関する情報など）

例：「福島で原発に関する新しい情報がないかテレビを見ていました。」

ニーズ5：災害後の供給（ガソリン、水、食料、衣類、医薬品の提供）

例：「その間、ラジオをつけて救援物資の情報を確認しました。」

ニーズ6：交通情報（道路の閉鎖や公共交通機関の情報、列車の状態）

例：「ウェブサイトを探して交通状況を示す情報を取得しました。」

ニーズ7：警告（津波警報、注意報、危険な状況に関する警告）

例：「最新の津波警報を知るために、カーラジオをつけました。」

ニーズ8：能動的ニーズなし（具体的に得た情報あるいは得ようとした情報に関する記述なし、受動的に情報を受け取った場合の記述のみ）

例：「テレビをつけたら、地震の被害状況を報告していました。」

<データ取得の目的・取り扱い>

- ・災害関連の情報行動に関する研究に用います。
- ・調査やデータ分析にはすべて匿名IDを使用いたします。

- ・ 今回のデータを基にして論文や学会などで研究発表を行うことがあります。

Appendix C:

Questions for screening tasks instruction to crowd workers

These questions' lists for screening tasks instruction on human senses and disaster-related information-seeking behaviour was given to crowdsourcing workers presented in Chapter 4.

1. Questions for screening task: Human senses

No	Sentence
1	文章 1: 「もうその陸橋のところで、橋がちょうど亀裂が入ったので、通行止めだって言われたので。」
2	文章 2: 「電車は発見できたんですけど、子どもとか、あとは誰も乗ってなかったんですね。」
3	文章 3: 「で、もう電気も暗くなっています。」
4	文章 4: 「非常用のはしごとかが出ていたのが見えたので。」
5	文章 5: 「ここが避難場所になっているということと、ここまで津波は来ないだろうという、あの、県の方とかの話もあったので、まあここにいれば大丈夫なんじゃないかって思いがあったんですね。」
6	文章 6: 「校舎の方に向かおうと思ったんですけど、体育館の入り口のところを見たら、校庭に止まっていた車が、上下に揺れて、校舎の方に向かって流れているのが見えたんですね。」
7	文章 7: 「寒かったですねえ。」
8	文章 8: 「でも、主人は生きているときも、「命は惜しくない」って。」
9	文章 9: 「そのように話していたことがありましたから、貝さんだったら、私でなくても他の人でも必ず助けに戻った人だと思います。」
10	文章 10: 「そして貝さんが残されたお仕事を、貝さんのように才能も能力もないんですけども、少しずつでも続けていくことによって、何か見えてくるのではないかなって。」
11	文章 11: 「そこで、地震の後、初めて会ったんです。」
12	文章 12: 「私らも携帯電話でいくら呼んでも、つながらなかった。」
13	文章 13: 「お昼過ぎかな、「不老園の人たちで助かっている人たちが11人いるから、アコちゃんもいるかもしれないから見にいった」って言われたんですね。」
14	文章 14: 「そこに行ったら、「すみません。敦子の母ですけど、敦子はどうなっていますか？」って聞いたら、「アコちゃんが一番最初に利用者を乗せて、車で運んでいきました」って。」
15	文章 15: 「すごい揺れで、もう人生で初めての揺れ。」
16	文章 16: 「揺れに耐えながらも、バスの運転手も走っては止まり、走っては止まり、大津波が来るんじゃないかという覚悟はしていた。」
17	文章 17: 「とにかく、バスを降りたとたんに、真っ黒い津波柱がもう来ていました。」
18	文章 18: 「それはあそこの山の通り、真っ黒くなってね。」

- 19 文章 19 : 「 もくもくもくもく、ああ、これは来ると思ってね。」
- 20 文章 20 : 「 もう水がガバッと来てね。」
- 21 文章 21 : 「 だから車椅子は捨てなさいって言ったの。」
- 22 文章 22 : 「 そして人だけ引きずり下ろしたの。」
- 23 文章 23 : 「 本当に普通の自家用車とバスだけです。」
- 24 文章 24 : 「 それも大型のバスがたくさん、すべて人が乗っているんです。」
- 25 文章 25 : 「 で、バスって車内が明るいですよね。」
-

2. Questions for screening task: Information channels

No	Sentence
1	文章 1: 「もうその陸橋のところで、橋がちょうど亀裂が入ったので、通行止めだ って言われたので。」
2	文章 2: 「ここが避難場所になっているということと、ここまで津波は来ないだろう という、あの、県の方とかの話もあったので、まあここにいれば大丈夫なんじゃない かって思いがあったんですね。」
3	文章 3: 「水が引いたあと、逆に私って言うよりは、子どもたちのほうが先に、ここ のフロアの上に、あそこに先生、足が見えるよとか、ここに何か人がいるっていう叫 び声が聞こえたりとか。」
4	文章 4: 「消防団は水門を閉めに行って、避難誘導にあたってくださいっていういつ ものね、津波の注意報・警報が出たときの防災無線が鳴り響いたので。」
5	文章 5: 「私と主人は、今度、玄関を開けて、外に出て、外から瓦とか下りてくるの を、落ちてくるのを2人で見ていたら、主人が、「あ、だめだ」って。」
6	文章 6: 「勘太郎さんが向こうから、「早く逃げなきゃだめなんだから」って言われ て、私は勘太郎さんのところに慌てて走っていったんですね。」
7	文章 7: 「でも、水が止まってくれたので、勘太郎さんが「早く下りろ」って。」
8	文章 8: 「たくさんいろんなことを言ってくれて、もう一人いた方と勘太郎さんと で、うちの主人はあそこの高台にいるから大丈夫なんだっていう話をして、私たち は、貝さんは大丈夫だって、一晩中信じてました。」
9	文章 9: 「何度も電話したけど、なかなか通じなくて。」
10	文章 10: 「でも、田老のトンネルを過ぎた辺りで、奇跡的に電話が通じて、「今、 田老だから、向かっているからね」と言ったら、「うん、うん」って、母親が2回う なずいたので。」
11	文章 11: 「携帯(電話)はメールをしたらすぐ帰ってくるような状態ではなくて、 メールは送れるんだけど、相手にはたぶん何時間後とか。」
12	文章 12: 「で、私のところにも何時間前のメールが届いてきて。」
13	文章 13: 「そうすると、友達が、何か原発で働いている人から、友達がいて、メー ルが来たんだけど、原発危ないみたいだよ。」
14	文章 14: 「だから早く避難した方がいいよ。」
15	文章 15: 「避難ってどこに避難するの?っていう返事をして、そのメールはたぶ ん何時間後に届いていて。」
16	文章 16: 「だから、何か、表をずっとその、防災パトロールみたいな車が走ってい ますけど、でも、何をしゃべっているか分からないんです。」
17	文章 17: 「とりあえず、原料探して、被災を免れた会社に電話。」

- 18 文章 18：「 そのころ電話もつながらなかったの、やっぱり最初は。」
- 19 文章 19：「 つながるようになってからですね。」
- 20 文章 20：「 少しは、希望が安心するんじゃないかなって感じでメールしたんですけど。」
- 21 文章 21：「 メールも届いていなかったみたいですね。」
- 22 文章 22：「 ちょっと地震だなんていう感じがしたら、もう一斉に、テレビと携帯（電話）から警報が鳴ったんで、ああこれはちょっと大きい地震だろうなっていうのは、速報が後から来たんでね。」
- 23 文章 23：「 テレビを見たら、ちょうど何分、揺れが何分か分からないですけど、ちょうど気仙沼の映像が流れてきて、それで気仙沼の市場が、天井ぐらまで水が行っていたのかな。」
- 24 文章 24：「 で、そのあとでラジオを聞いて、ラジオを聞いているうちにだんだんね、3mが6mになり、あと、北の方では10mを超えているなんていう情報が入ってきて。」
- 25 文章 25：「 私らも携帯電話でいくら呼んでも、つながらなかった。」
-

3. Questions for screening task: Passive information needs

No	Sentence
1	文章 1: 「もうその陸橋のところで、橋がちょうど亀裂が入ったので、通行止めだって言われました。」
2	文章 2: 「ここが避難場所になっているということを教えてもらいました。」
3	文章 3: 「私と主人は、今度、玄関を開けて、外に出ると、外から瓦とか落ちてくるのが見えました。」
4	文章 4: 「知人が向こうから、「早く逃げなきゃだめなんだから」って言われて、私は慌てて走って行きました。」
5	文章 5: 「でも、水が止まってくれたので、親戚が「早く下りろ」って。」
6	文章 6: 「父は、お母さんとお姉さんの無事を確認してから、車を置いて、私のところに駆けつけてくれたんだそうです。」
7	文章 7: 「揺れが始まってから数分経った頃、テレビで大地震と大津波警報が報じられました。」
8	文章 8: 「もう周りのあれ（景色）が全然前と違っていたので、びっくりしながらショックでした。」
9	文章 9: 「そうすると、原発で働いている友達がいる、原発危ないみたい、というメールが来た。」
10	文章 10: 「だから早く避難した方がいいよ、と言われました。」
11	文章 11: 「それから、何度か大津波警報とかなんか出ていて、そういうのがあっても、大きな津波は来なかったし。」
12	文章 12: 「この入谷地域で食料を出していかなかったら、全くどこからも来ないって感じて。」
13	文章 13: 「おいしく食べたってことで、「涙がぼろぼろこぼれてきたよ」っていう人もいっぱいいたし。」
14	文章 14: 「今ここに住んでいる家が、父親と母親が住んでいた家だったんですけど、そこにとにかく現金だけを持って早く行けと、言われました。」
15	文章 15: 「ちょっと地震だなっていう感じがしたら、もう一斉に、テレビと携帯（電話）から警報が鳴りました。」
16	文章 16: 「テレビを見たら、ちょうど気仙沼の映像が流れてきて、それで気仙沼の市場の天井まで浸水していたことが報告されていました。」
17	文章 17: 「兄が町のスポーツセンターが避難所になっていて食料や水をくれるかもしれないと言うので行ってみました。」

- 18 文章 18：「 で、そのあとでラジオを聞いて、ラジオを聞いているうちにだんだんね、3m が6m になり、あと、北の方では10m を超えているなんていう情報が入ってきて。」
 - 19 文章 19：「 で、津波が小名浜に3時10分ごろに到着したと言っていました。」
 - 20 文章 20：「 日の出で明るくなってから、下の様子を見にいったんですね。」
 - 21 文章 21：「 知り合いが波にさらわれるのを見たとき、体を震わせ、泣きながらの説明でした。」
 - 22 文章 22：「 テレビをつけると、福島第一原発の事故による放射能漏れのニュースが流れており、不安がつのりました。」
 - 23 文章 23：「 市役所本庁舎から避難しており、水、毛布がないという情報でした。」
 - 24 文章 24：「 家もないし、田んぼだったところもヘドロと砂で埋まってしまっていて、原形が分からないような状態でしたし。」
-

4. Questions for screening task: Information sources

No	Sentence
1	文章1: 「もうその陸橋のところで、橋がちょうど亀裂が入ったので、通行止めだ って言われたので。」
2	文章2: 「ここが避難場所になっているということと、ここまで津波は来ないだろう という、あの、県の方とかの話もあったので、まあここにいれば大丈夫なんじゃない かって思いがあったんですね。」
3	文章3: 「水が引いたあと、逆に私って言うよりは、子どもたちのほうが先に、ここ のフロアの上に、あそこに先生、足が見えるよとか、ここに何か人がいるって叫 び声が聞こえたりとか。」
4	文章4: 「私と主人は、今度、玄関を開けて、外に出て、外から瓦とか下りてくるの を、落ちてくるのを2人で見ていたら、主人が、「あ、だめだ」って。」
5	文章5: 「何か映画でも、よく大津波の放送をされたのも見ていたんですけど、そう いうものが何かこう、大きな壁になって、黒い壁になって、全部私たちのところに押 し寄せてくるみたいなの。」
6	文章6: 「貝さんは、女川の町が、四方山と海に囲まれて、活気のある女川の町が大 好き、女川に住んでいる人たちが大好きなんですよ。」
7	文章7: 「だから、ここに生きている人たちの喜びとか、悲しみ、貝さんの絵にもあ るように、その悲しみに静かに向かい合って、立ち上がろうとする人々を、絵にも描 いてきたと思うんです。」
8	文章8: 「女川が大好きなんですよ。だから女川の次の世代の人たちのことも考え て、貝さんは残していったんでないのかしら。」
9	文章9: 「そこに行ったら、「すみません。敦子の母ですけど、敦子はどうなってい ますか?」って聞いたら、「アコちゃんが一番最初に利用者を乗せて、車で運んでい きました」って。」
10	文章10: 「患者さんもかわいそうだったけれども。」
11	文章11: 「テレビでは、マスクをしてください、換気扇は回さないでください、お 家の中にいてください。」
12	文章12: 「だから、何か、表をずっとその、防災パトロールみたいな車が走ってい ますけど、でも、何をしゃべっているか分からないんです。」
13	文章13: 「何を言っているか分からないんですよ。」
14	文章14: 「で、追いかけてようにしても、もう遠くの方に行っていて、追いかけれ ないし、市役所に電話すれば通じないし。」
15	文章15: 「で、市役所にも行っているんですね。」
16	文章16: 「「丸仙(旅館)さん逃げて」って。」

- 17 文章 17：「とりあえず、原料探しで、被災を免れた会社に電話。」
 - 18 文章 18：「今までも、何度も大津波警報とかなんか出ていて、そういうのがあっても、多少来なかったし。」
 - 19 文章 19：「隣が消防署だったものですから、走って行って、津波が来るっていうことと、3mの津波が来るっていうことと、それから水門は閉まらないと。」
 - 20 文章 20：「やっぱり閉めに行った方がいいですかと言ったら、任せると言われましたので、その足で戻って。」
 - 21 文章 21：「（親戚が）出てきてから、「大丈夫だから、（津波が）来たら逃げるから、大丈夫だから」って。」
 - 22 文章 22：「すぐ裏に山があるから、ちゃんと逃げてね」って言ったら、「分かったから、分かったから」って言って。」
 - 23 文章 23：「ちょっと地震だなんていう感じがしたら、もう一斉に、テレビと携帯（電話）から警報が鳴ったんで、ああこれはちょっと大きい地震だろうなっていうのは、速報が後から来たんでね。」
 - 24 文章 24：「テレビを見たら、ちょうど何分、揺れが何分か分からないですけど、ちょうど気仙沼の映像が流れてきて、それで気仙沼の市場が、天井ぐらいまで水が行っていたのかな。」
 - 25 文章 25：「気仙沼の市場がこれぐらいだから、こっちにも津波は来る、っていうのはありましたけど、まあそんなに、こんなふうにね、町が全部やられちゃうような津波とは思わなかった。」
-

5. Questions for screening task: Active information needs

No	Sentence
1	文章 1: 「私は避難指示区域の地図を見直しました。」
2	文章 2: 「とりあえず、原料探して、被災を免れた会社に電話。」
3	文章 3: 「通行止めになった県内の高速道路の破損箇所がないか確認するためにパトロールに出ました。」
4	文章 4: 「娘に携帯電話でいくら呼んでも、つながらなかった」
5	文章 5: 「隣が消防署なので走って行って、3メートルの津波がくるという情報を得た。」
6	文章 6: 「スケッチしているんだけど。」
7	文章 7: 「放射能に関する情報を毎日丹念に記録しました。そして、中通り地区で異変に気がつきました。」
8	文章 8: 「ラジオに耳をかたむけるとニュースでは、地震の報道があり、かなり強い地震なのだと認識しました。」
9	文章 9: 「すごい揺れで、もう人生で初めての揺れ。」
10	文章 10: 「軽油を手配するために、市内の業者さんを回って分けてくれるところを探しました。」
11	文章 11: 「このようにガソリン不足が続くなか、メーカーに直接連絡したところ、新潟にある輸入基地に取りに来ればガソリン供給可能との確認を得て。」
12	文章 12: 「避難用のバスの状況を確認しようと、役場に行きました。」
13	文章 13: 「老人ホームに行って息子はいますか、と聞きました。」
14	文章 14: 「後ろを見た時、大きい黒い波がバーンときた」
15	文章 15: 「県内の各施設に連絡して、高齢者の避難先を探しました。」
16	文章 16: 「薬の確保をしていたところ、県の災害対策本部にあることが分かりました。」
17	文章 17: 「激しい揺れに襲われた直後、被害の状況を確認しようと、原発の構内を見て回りました。」
18	文章 18: 「隣が消防署だったものですから、走って行って、津波が来るっていうことと、3mの津波が来るっていうことと、それから水門は閉まらないと。」
19	文章 19: 「今までも、何度も大津波警報とかなんか出ていて、そういうのがあっても、多少来なかったし。」
20	文章 20: 「車は、高速道路上からの下車を促す緊急案内板を横目に見ながら進ませました。」

- 21 文章 21：「僕たち 2 階に上がって、3 部屋あったんですけど、どの部屋にしようかって思ってパッと見た瞬間には自分たちがいつも寝ている寝室の窓からドーンとものが来て衝撃があってぐしゃって感じがあったんで。」
 - 22 文章 22：「 で、波がだんだんなくなってきて、すぐ山に上って、おばあちゃんが流されていった方向に、ちょっと足を引きずりながら行ったら、おばあちゃんはその辺の、この辺ですね。」
 - 23 文章 23：「市民体育館の被害状況を全員で見て確認しました。」
 - 24 文章 24：「カーナビをテレビに置き換えて見てましたけれど、大津波警報っていうのは初めて聞いてきましたね。」
-

Appendix D:

Project task instruction on human senses and disaster-related ISB to crowd workers

This project task instruction was given to crowdsourcing workers presented in Chapter 4.

1. Project instruction: Human senses

Project Instruction: 五感

Subject: ○○様【プロジェクト】体験談文章への五感ラベル付与作業

In the message: ○○ (Lancer's name) 様

体験談文章への五感ラベル付与作業を実施していただいたランサーのうち、特に作業の精度が高いと判断された皆様に、改めてプロジェクトとして依頼をさせていただいています。

ラベル付与作業そのものに大きな変更点はありませんが、今回付与していただきたい文章（あるいはその断片）の数は、310 前後あります。一方、今回は体験談の文章全体を閲覧していただくので、ラベル付与対象となる文章の前後関係（文脈）がより明確になります。

体験談の文章は PDF ファイルで提供し、ラベル付与作業の結果はエクセルファイルに記入していただく方式です。したがって両者のファイル操作ができる方に参加していただきたいと考えております。

体験談の文章には、災害にあわれた方の発言の他に、ナレーターの発言が含まれています。また、知人や家族の方の発言が含まれている場合もあります。提供させていただく書類には色づけがしてありますので、黒色のついた文は文脈情報（非ラベル付与対象文）としてお読みいただくだけで結構です。

赤色の文のみラベル付与を行なってください。念のため、ラベル付与情報を記入していただくエクセルファイルにもラベル付与対象となる行番号が予め記載してありますので、そちらも合わせてご確認くださいながら、作業を進めていただけると幸いです。

税抜報酬金額は 1500 円を予定しています。税金と手数料はこちらで負担いたします。

提案締め切りは 2 日程度、ラベル付与データの納期は、作業開始後 3 日程度を検討しています。応募に際し、より多くの時間が必要でしたら検討しますので、気軽にお尋ねください。

以上、簡単な説明になりますが、ご提案をご検討いただければ幸いです。

参考までに、体験談文章への五感ラベル付与作業の概要を以下に掲載します。

本タスクでは、震災体験談の文章を、あるルールに従って分類していただきます。具体的には、各文章に対して人間の五感を使った記述が含まれているかを判断していただきます。

今回分類していただく五感は、視覚、聴覚、味覚、嗅覚および触覚です。それぞれの定義と該当する例文をよく読んで、その特徴を理解した上でタスクを実施してください。また、一つの文章で1つ以上の感覚が該当する場合は、複数の選択肢を選択することができます。

1. 視覚は見ることのみまたは能力のことである；見えるものまたは見られるもの。

例：「パッと見たら、波が立って来たんですよ。」

2. 聴覚は音を知覚する能力である。

例：「そのうち瓦が、ガチャガチャと落ちてくる。」

3. 味覚は物質と口または喉との接触時に感知される風味の感覚である。

例：「このバターはすっぱい味がする。」

4. 嗅覚は鼻の器官によって匂いや香りを感じる能力である。

例：「ちょっとにおいの臭いもの。」

5. 触覚は身体の一部が何かに触れる行為である。

例：「波に、私が乗っかっちゃったっていう感じだと思うんですよ。」

6. なし

<データ取得の目的・取り扱い>

- ・ 災害関連の情報行動に関する研究に用います。
- ・ 調査やデータ分析にはすべて匿名 ID を使用いたします。
- ・ 今回のデータを基にして論文や学会などで研究発表を行うことがあります。

<お問い合わせへの対応>

- ・ 本プロジェクトのお問い合わせへの返信は以下の時間に行いますので、あらかじめご了承ください。

月～金（祝日を除く）

2. Project instruction: Passive information needs

Project Instruction: ニーズ（受動）

Subject: ○○様【プロジェクト】体験談文章への情報ニーズ（受動的）ラベル付与作業

In the message: ○○（Lancer's name）様

体験談文章への情報ニーズ（受動的）ラベル付与作業を実施していただいたランサーのうち、特に作業の精度が高いと判断された皆様に、改めてプロジェクトとして依頼をさせていただいています。

ラベル付与作業そのものに大きな変更点はありませんが、付与していただきたい文章（あるいはその断片）の数は、310 前後あります。一方、今回は体験談全体を閲覧していただくので、ラベル付与対象となる文章の前後関係（文脈）がより明確になります。

体験談の文章は PDF ファイルで提供し、ラベル付与作業はエクセルファイルに記入していただく方式です。したがって両者のファイル操作ができる方に参加していただきたいと考えております。

体験談の文章には、災害にあわれた方の発言の他に、ナレーターの発言が含まれています。また、知人や家族の方の発言が含まれている場合もあります。提供させていただく書類には色づけがしてありますので、黒色のついた文は文脈情報（非ラベル付与対象文）としてお読みいただくだけで結構です。

赤色の文のみラベル付与を行なってください。念のため、ラベル付与情報を記入していただくエクセルファイルにもラベル付与対象となる行番号が予め記載してありますので、そちらも合わせてご確認いただきながら、作業を進めていただくと幸いです。

税抜報酬金額は 1500 円を予定しています。税金と手数料はこちらで負担いたします。

提案締め切りは 2 日程度、ラベル付与データの納期は、作業開始後 3 日程度を検討しています。応募に際し、より多くの時間が必要でしたら検討しますので、気軽にお尋ねください。

以上、簡単な説明になりますが、ご提案をご検討いただければ幸いです。

参考までに、体験談文章への情報ニーズ（受動的）ラベル付与作業の概要を以下に掲載します。

本タスクでは、震災体験談の文章を、あるルールに従って分類していただきます。具体的には、各文章に対して人間の情報ニーズ（受動的）を使った記述が含まれているかを判断していただきます。

今回分類していただく情報ニーズ（受動的）は、積極的に情報を求める「能動的」情報ニーズと、向こうからやってきた情報が求めているものと一致する「受動的」情報ニーズがあります。今回のタスクでは、後者の受動的情報ニーズの記述の有無を判断していただき、その内容を分類していただきます。ニーズが実際に満たされたか否かは問いませんので、ご注意ください。また、一つの文章で 1 つ以上のカテゴリが該当すると考えられる場合においても、最も適切と考えられるカテゴリを一つだけお選びください。

注意事項：下記のカテゴリは、あくまで受動的に情報を受け取った場合の記述に適用するカテゴリです。自ら能動的に情報を求めた場合の記述は、すべて「ニーズ8：受動的ニーズなし」に該当しますので、ご注意ください。

ニーズ1：現状（地域の被害状況、地域、県、国の状況）

例：「港の被害状況を聞いて、自宅近辺との被害規模の違いに驚きました。」

ニーズ2：災害情報（災害情報、損害情報、災害準備情報、地震情報、津波情報）

例：「緊急地震情報システム受信装置30は、各地に配置された地震計による地震検知に基づいた地震速報を受信する。」

ニーズ3：避難指示（避難指示と避難所の検索）

例：「帰宅が困難な場合は保育園に引き返し泊まるように指示されました。」

ニーズ4：原子力事故（発電所における爆発）

例：「ラジオから福島第一原発が津波で被災し、爆発したとのニュースが流れました。」

ニーズ5：災害後の供給（ガソリン、水、食料、衣類の提供）

例：「ボランティアの皆さんが避難者用の食べ物を用意してくれるとの連絡がありました。」

ニーズ6：他者の体験談（他者の身に起こった出来事）

例：「避難してきた近所の方から自宅が津波で浸水したことをききました。」

ニーズ7：警告（津波警報、注意報、危険な状況に関する警告）

例：「国道を走る消防車から大津波警報のアナウンスがありました。」

ニーズ8：受動的ニーズなし（情報ニーズの記述なし、能動的情報ニーズの記述のみ）

例：「（父親に）いくらお金かかってもいいです。」

〈データ取得の目的・取り扱い〉

- ・災害関連の情報行動に関する研究に用います。
- ・調査やデータ分析にはすべて匿名IDを使用いたします。
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〈お問い合わせへの対応〉

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月～金（祝日を除く）

3. Project instruction: Active information needs

Project Instruction: ニーズ（能動）

Subject: ○○様【プロジェクト】体験談文章への情報ニーズ（能動的）ラベル付与作業

In the message: ○○（Lancer's name）様

体験談文章への情報ニーズ（能動的）ラベル付与作業を実施していただいたランサーのうち、特に作業の精度が高いと判断された皆様に、改めてプロジェクトとして依頼をさせていただいています。

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情報ニーズ は、積極的に情報を求める「能動的」情報ニーズと、向こうからやってきた情報が求めていたものと一致する「受動的」情報ニーズがあります。自ら情報を提供する行為は情報ニーズに当てはまりません。今回のタスクでは、前者の能動的情報ニーズの記述の有無を判断していただき、求めた情報の内容を分類していただきます。実際に情報を得ることができたか否かは問いませんので、ご注意ください。また、一つの文章で 1 つ以上のカテゴリが該当すると考えられる場合においても、最も適切と考えられるカテゴリを一つだけお選びください。

注意事項：下記のカテゴリは、あくまで自ら能動的に情報を求めた場合の記述に適用するカテゴリです。受動的に情報を受け取った場合の記述は、すべて「ニーズ8：能動的ニーズなし」に該当しますので、ご注意ください。

ニーズ1：現状（家族や知り合いの状況、周りの状況）

例：「途中、平潟に住む家族に連絡しても電話は、繋がらなかった。」

ニーズ2：災害情報（損害情報、災害準備情報、地震情報）

例：「支所内に戻り震度6弱とを確認した。」

ニーズ3：避難指示（避難指示と避難所の検索、避難場所に関する情報）

例：「車で避難しようとしていた男性に「どこへ行けばいいかわからないので、教えてください」と尋ねました。」

ニーズ4：原子力事故（発電所における爆発、放射線に関する情報など）

例：「福島で原発に関する新しい情報がないかテレビを見ていました。」

ニーズ5：災害後の供給（ガソリン、水、食料、衣類、医薬品の提供）

例：「その間、ラジオをつけて救援物資の情報を確認しました。」

ニーズ6：交通情報（道路の閉鎖や公共交通機関の情報、列車の状態）

例：「ウェブサイトを探して交通状況を示す情報を取得しました。」

ニーズ7：警告（津波警報、注意報、危険な状況に関する警告）

例：「最新の津波警報を知るために、カーラジオをつけました。」

ニーズ8：能動的ニーズなし（具体的に得た情報あるいは得ようとした情報に関する記述なし、受動的に情報を受け取った場合の記述のみ）

例：「テレビをつけたら、地震の被害状況を報告していました。」

〈データ取得の目的・取り扱い〉

- ・災害関連の情報行動に関する研究に用います。
- ・調査やデータ分析にはすべて匿名IDを使用いたします。
- ・今回のデータを基にして論文や学会などで研究発表を行うことがあります。

〈お問い合わせへの対応〉

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月～金（祝日を除く）

4. Project instruction: Information sources

Project Instruction: 情報源

Subject: ○○様【プロジェクト】体験談文章への情報源ラベル付与作業

In the message: ○○（Lancer's name）様

体験談文章への情報源ラベル付与作業を実施していただいたランサーのうち、特に作業の精度が高いと判断された皆様に、改めてプロジェクトとして依頼をさせていただいています。

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体験談の文章には、災害にあわれた方の発言の他に、ナレーターの発言が含まれています。また、知人や家族の方の発言が含まれている場合もあります。提供させていただく書類には色づけがしてありますので、黒色のついた文は文脈情報（非ラベル付与対象文）としてお読みいただくだけで結構です。

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税抜報酬金額は 1500 円を予定しています。税金と手数料はこちらで負担いたします。

提案締め切りは 2 日程度、ラベル付与データの納期は、作業開始後 3 日程度を検討しています。応募に際し、より多くの時間が必要でしたら検討しますので、気軽にお尋ねください。

以上、簡単な説明になりますが、ご提案をご検討いただければ幸いです。

参考までに、体験談文章への五感ラベル付与作業の概要を以下に掲載します。

本タスクでは、震災体験談の文章を、あるルールに従って分類していただきます。具体的には、各文章に対して人間の情報源を使った記述が含まれているかを判断していただきます。

今回分類していただく情報源は、入手した（あるいは入手しようとした）情報の提供元や発生源のことです。それぞれの情報源の定義と該当する例文をよく読んで、その特徴を理解した上でタスクを実施してください。また、一つの文章で 1 つ以上の情報源が該当すると考えられる場合においても、最も適切と考えられる情報源を一つだけお選びください。

情報源 1：放送メディア（映画、ラジオ、録音された音楽、テレビなどの媒体を介して情報を提供する。）

例：「テレビをつけると、私の目に映ったのは、信じられない光景でした。」

情報源 2：家族/知人（家族、知人、ご近所やたまたま居合わせた誰か）

例：「帰宅してきた近所の児童が「道路が割れてる！」と言いました。」

情報源 3：外国政府

例：「オーストラリア政府から半径 80km 圏内から避難するように指示がありました。」

情報源 4：安全衛生・保安防災組織（救急車、消防隊、支援ボランティア団体、保健所、警察）

例：「津波の発生を知らせる消防車のサイレンとアナウンスが流れた。」

情報源 5：気象庁

例：「携帯電話で津波警報を知りました。」

情報源 6：地方自治体（市役所職員、地区役員、県庁、広報、支援センター）

例：「携帯と公衆電話で市対策本部と連絡を取りながら救援貸の状況を確認しました。」

情報源 7：職場のコミュニティ/同僚（組合、同僚、店員、客、親または保護者、教育機関の学生、教師、役員）

例：「帰宅が無理な場合は保育園に引き返すように理事長から指示されました。」

情報源 8：情報源なし

例：「福島市で震度 6 弱とのことであった。」

<データ取得の目的・取り扱い>

- ・災害関連の情報行動に関する研究に用います。
- ・調査やデータ分析にはすべて匿名 ID を使用いたします。
- ・今回のデータを基にして論文や学会などで研究発表を行うことがあります。

<お問い合わせへの対応>

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月～金（祝日を除く）

5. Project instruction: Information channels

Project Instruction: 情報経路

Subject: ○○様【プロジェクト】体験談文章への情報入手経路ラベル付与作業

In the message: ○○（Lancer's name）様

体験談文章への情報入手経路ラベル付与作業《6》を実施していただいたランサーのうち、特に作業の精度が高いと判断された皆様に、改めてプロジェクトとして依頼をさせていただきます。

ラベル付与作業そのものに大きな変更点はありませんが、付与していただきたい文章（あるいはその断片）の数は、310 前後あります。一方、今回は体験談全体を閲覧していただくので、ラベル付与対象となる文章の前後関係（文脈）がより明確になります。

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体験談の文章には、災害にあわれた方の発言の他に、ナレーターの発言が含まれています。また、知人や家族の方の発言が含まれている場合もあります。提供させていただく書類には色づけがしてありますので、黒色のついた文は文脈情報（非ラベル付与対象文）としてお読みいただくだけで結構です。

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本タスクでは、震災体験談の文章を、あるルールに従って分類していただきます。具体的には、各文章に対して人間の情報入手経路を使った記述が含まれているかを判断していただきます。

今回分類していただく情報入手経路は、人々が情報入手する際に使われたメディアや機器のことです。対面での口頭コミュニケーションも入手経路に含まれます。それぞれの情報入手経路の定義と該当する例文をよく読んで、その特徴を理解した上でタスクを実施してください。また、一つの文章で 1 つ以上の経路が該当すると考えられる場合においても、最も適切と考えられる経路を一つだけお選びください。

情報入手経路 1: 対面での口頭 (例: 人々の声、指示)

例: 「町内会の方から、津波が家まで到達する恐れがある、と言われたので、自宅に戻った。」

情報入手経路 2: インターネット (例: SNS、ウェブサイト)

例: 「ウェブページ等で可能な限り情報を集めて、安全がある程度確認できたので、帰宅させることにした。」

情報入手経路 3: Eメール (例: パソコンや携帯のEメールやメッセージ)

例: 「途中で知人から、自宅近辺まで津波が来ているらしいとのメールが届きました。」

情報入手経路 4: 電話 (例: 固定電話、携帯電話、公衆電話)

例: 「家族に電話をして近況を尋ねました。」

情報入手経路 5: ラジオ (例: ラジオ、携帯電話ラジオ、カーラジオ、無線ラジオ)

例: 「会社から提供された車のカーラジオから情報を収集しました。」

情報入手経路 6: スピーカーと看板 (例: 救急車、消防車、都市広報車、ヘリコプター、オフィススピーカー、警察車両、居住者、学校放送、電子掲示板)

例: 「国道を走る消防車から大津波警報のアナウンスが聞こえてきました。」

情報入手経路 7: テレビ (自宅テレビ、携帯テレビ、車載テレビ)

例: 「船の中のテレビから情報を得ることができました。」

情報入手経路 8: 経路なし (情報入手経路の記述なし)

例: 「福島市で震度 6 弱とのことであった。」

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