

An Exploration of A Social-Cognitive Framework for Improving the Human-Centric Risk Communication

Yiwei Li

Graduate School of International Media,
Communication, and Tourism Studies,
Hokkaido University, Japan
yiweili@imc.hokudai.ac.jp

Yu Guo

Graduate School of International Media,
Communication, and Tourism Studies,
Hokkaido University, Japan
guoyu@imc.hokudai.ac.jp

Naoya Ito

Research Faculty of Media and Communication,
Hokkaido University, Japan
naoya@imc.hokudai.ac.jp

ABSTRACT

With the aim of improving human-centric risk communication, this research in progress paper argues for a social-cognitive perspective focusing on the interaction between laypeople and the information environment. A model is designed to predict laypeople's environmental risk perception and information seeking behavior. Using data from a national online survey ($N=1,032$), our research is an effort to test the predictive power of the social-cognitive model. Practical implications are also discussed in this paper.

Keywords

Environmental risk, human-centric risk communication, social-cognitive model.

INTRODUCTION AND THEORETICAL BACKGROUND

Regarding environmental risk studies, experts use scientific methods to calculate the probability and potential loss of risk and develop management options to deal with the threat (Stern, 2007). However, the largest population exposed to environmental risks is not the experts, but people who do not possess perfect knowledge and lack sufficient rationality to estimate the real risk (Viklund, 2003). Due to this, risk perception of laypeople normally creates a distance from experts' calculation. In order to avoid misunderstanding and irrational behaviors, risk communication is planned (Covello & Sandman, 2001). Developed from a notion that experts should try all means to deliver scientific knowledge to the public, risk communication has undergone a short but rapid evolution in an effort to reduce the cognitive disparity (Leiss, 1996). After years of practice, the experts realize that it is important to design the transmission of information in accordance with the feedback of the public who actually determine the effectiveness of risk communication (Frewer, 2004). Therefore, at the later stage in the evolution of risk communication, experts and regulators begin to take laypeople not only as the recipients of information but also as the collaborators in planning risk communication (Covello & Sandman, 2001).

The psychometric approach (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978) is widely replicated to explore laypeople's judgment of risk (Siegrist, 2010). Studies with the approach suggest that risk perception is predictable and quantifiable. Laypeople's intuitive judgment of risk is greatly influenced by the information which carries affective signals (Slovic, Finucane, Peters, & MacGregor, 2010). For instance, the positive or negative representations of risk and the sensational content in the message stimulate people's feeling about risk. Using factor analysis, the multifarious feelings (i.e., dreadful, uncontrollable, unknown, catastrophic) as attributes of judgment of risk can be grouped into a limited number of factors to explain risk perception.

The social amplification of risk framework (SARF) (Kasperson et al., 1988) has extended the approach of risk communication from a psychological perspective to a socially oriented one. SARF provides a linear model manifesting the information flow. It claims that risk leads to ripple effects because of the amplification (or attenuation) of the actual risk by various agencies encoding the messages in the transmission of risk information. As a result, SARF has been applied to exploring how different agencies in the communication network (i.e., individuals, groups, and media) function as predictors of individual or social level responses. However, although developing as a cross-disciplinary approach by linking risk and the social context together, SARF seldom successfully predicts ripple effects (Breakwell & Barnett, 2003), which makes it rather descriptive than predictive.

What is urgent for risk communication is the shift of paradigm. From the view of mass communication, the paradigm should be defined by observing people's adaptation and reinforcement to the environment (Lang, 2013). Starting from the human-centric notion, this research in progress paper introduces the social cognitive theory (SCT) (Bandura, 1986) for predicting the public's reactions. More comprehensive than the psychometric approach and SARF, SCT asserts that the individual, behavioral, and environmental factors influencing human development interplay in a triadic reciprocal relationship (Bandura, 1986). Humans are proactive. Via observing the environment, they enable their self-regulation with the help of both outside stimuli and inner forces to change their cognitive and behavioral patterns. Changes as such may have an impact on the environment, or encourage people to select new environment more suitable for their development (Wood & Bandura, 1989). The strongest influence of humans' self-regulation is self-efficacy, which refers to people's beliefs in their capabilities to execute control over what they encounter during their interaction with the environment (Bandura, 1989). A considerable amount of empirical evidence supports that perceived self-efficacy has the closest association with behavioral variables and is a controlling determinant of behavior change (Prati, Pietrantonio, & Zani, 2011; Rimal, 2001; Schwarzer & Fuchs, 1995).

RESEARCH DESIGN

The fundamental idea of SCT is that the personal, behavioral, and environmental factors impacting human development interact with each other bidirectionally. As presented in Figure 1, we set laypeople's "media exposure" as the environmental variable, "risk perception" as the personal (psychological) variable, and "information seeking" as the behavioral variable.

We first assume that people's extent of exposure to media will affect their risk perception because media is a central force behind the social construction of risk (Miles & Morse, 2007). In this hypothesized causation, we invite "media credibility" and "affect in information" as potential moderators that may enhance, buffer, or antagonize the effect of media exposure on risk perception. The public's positive opinion on media credibility can be seen as their trust in the source of risk information. Trust in information source can reduce people's perception of the complexity and uncertainty of a taxing situation (Welch et al., 2005). Therefore, perceived media credibility is likely to decrease risk perception and buffer the effect of media exposure on risk perception. The reason of inviting "affect" as a moderator is that it is supported to be a significant factor that influences risk perception (Slovic, 2010). As used here, "affect" means the specific quality of "goodness" or "badness" experienced as a feeling state (Slovic et al., 2010). Within the information environment, the media representations of risk are tagged to varying degrees with positive and negative affect (i.e., earthquake is represented as uncontrollable and dread while new technology is represented as beneficial). People build their "affect pool" with the help of media representations of risk, and they consult all the tags in the pool in the process of making a judgment. Most of the environmental risks are negatively represented as, for example, "dread" and "catastrophic". Hence, in our research, we try to find evidence to support the assumption that "affect in risk information" will increase people's risk perception and enhance the effect of media exposure on risk perception.

The second and third major hypotheses in our research are related to the predicted effect of environmental and personal factors on behavior. Since perceived self-efficacy is supported to be a factor directly and significantly predicts actual behavior, we introduce "perceived information seeking self-efficacy" as a mediator of the relationship between environmental/personal factor and the behavior. To be specific, we propose two causal chains: one assumes that media exposure causes perceived self-efficacy, and perceived self-efficacy causes information seeking behavior; the other one assumes that risk perception causes perceived self-efficacy, and perceived self-efficacy causes information seeking. The former parts of the two causal chains are based on the explanation of the sources of self-efficacy in SCT. According to Bandura (1997), there are four major sources of perceived self-efficacy: direct experience, indirect experience (observational learning), social persuasion, and psychological state. Here, we focus on the information environment. Media can be used to provide opportunities for people to learn from others' risk experiences and persuade people to believe in their capabilities to master a

given activity. Affected by the information environment, risk perception as a psychological factor may contribute to changes in people’s perceived self-efficacy. If the two causal chains are supported by the results, they will be insightful findings for risk communication design. That means people’s behavior to seek information might be altered by regulating their perceived self-efficacy.

The predictions in dash lines are assumed to happen in a longitudinal process. First, knowledge accumulated through information seeking may change people’s judgment of risk. Changes in risk perception may let people have a re-evaluation about the information environment. Second, in the process of information seeking, people may gradually shape their preference of information sources and proactively select the media environment. The effect of both risk perception and information seeking on perceived media environment could be seen as the feedback from the public. To plan for more effective risk communication, experts and regulators can make full use of such information.

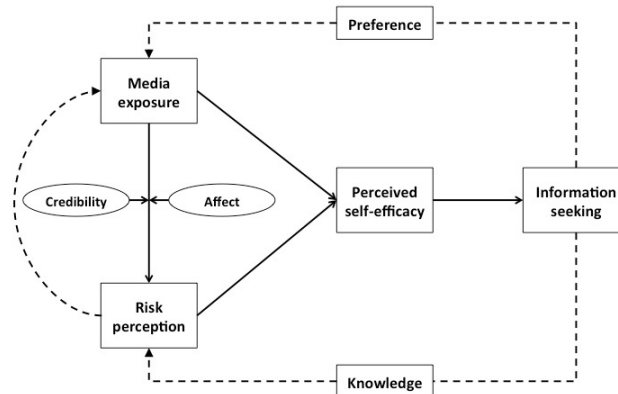


Figure 1. The Hypothesized Model Designed on the Basis of the Social-Cognitive Perspective

METHODOLOGY

We conducted an Internet survey during the first week of September 2013. Invitation email with a URL link of the web-based questionnaire was sent to 12,026 Chinese members of the panel of a Japan based research company. Respondent’s location was identified by IP address in six areas of the Mainland China (*The East China, The Northeast China, The North China, The South Central China, The Northwest China, and The Southwest China*). In total, we collected 1,032 valid responses with an 8.58% response rate. Among the participants, there are 511 males (49.5%) and 521 females (50.5%) with age ranging from 18 to 65 years old ($M=33.78, SD=9.22$). Most of the participants (74.0%) have a Bachelor’s degree or higher. More than half of the participants (55.4%) have a monthly income at the level of 3,001 to 8,000 RMB. Thirteen environmental hazards (*Earthquake, Flood, Landslide, Drought, Climate Change, Air Pollution, Freshwater Shortage, Species Extinction, Chemical Waste, Unsafe Food, Genetically Modified Food, Nuclear Radiation, Urbanization*) are adopted for the survey. Items in the questionnaire are listed in Table 1. All the items were rated at a 7-point scale (1=*not at all*, 7=*extremely*).

Variable	Item
Environmental Risk Perception	How risky do you consider the hazard to be to Chinese people and the China society?
	How afraid do you feel when you think of the hazard?
	How new to you the hazard is?
	How controllable do you consider the hazard to be, in terms of people’s capability to control its impact?
	How harmful do you think the hazard will be to the next generation and the future development of China?
	How are you worried about the hazard at this point in your life?
Media Exposure	Television/Newspaper/Radio/Magazine/The Internet/Social Network Site is my main source of information.
Media Credibility	Information from Television/Newspaper/Radio/Magazine/The Internet/Social Network Site is believable.
Affect	Information about environmental hazards from the media is frightening.
	Information about environmental hazards from the media is upsetting.
	Information about environmental hazards from the media is alerting.
Information Seeking	I am interested in information about environmental hazards and the coping strategies.
	I have intentions to search information about environmental hazards and the coping strategies.
	I often attend to information about environmental hazards and the coping strategies.
	I often search for information about environmental hazards and the coping strategies.
Information Seeking Self-Efficacy	I have confidence in my ability to understand risk information.
	I have confidence in my ability to search for risk information.
	I have confidence in my ability to evaluate the credibility of risk information.
	I have confidence in my ability to identify rumors or unreal risk information.

Table 1. Instruments of the Research

Proceedings of the 11th International ISCRAM Conference – University Park, Pennsylvania, USA, May 2014
 S.R. Hiltz, M.S. Pfaff, L. Plotnick, and P.C. Shih, eds.

DISCUSSION AND FUTURE WORK

Currently, we are working to identify the characteristics of environmental risk perception. Perceptions of the thirteen environmental hazards are analyzed separately since the judgments of different hazards may differ. Because we have both natural disasters and human-made hazards in the list of the thirteen items, it is also possible for us to do comparative studies between the two types of environmental risk. Next, we will do a series of cause and effect analyses. Hierarchical multiple regression will be executed to test the moderating effect. Path analysis method will be used to test mediation. We are considering applying the structural equation modeling (SEM) for model testing and model development. Moreover, a longitudinal study is necessary for improving the social-cognitive framework. We need to investigate whether laypeople's risk information seeking behavior results in their knowledge increment, and how knowledge of risk affects risk perception. We also need data about laypeople's information source preference. We consider qualitative method such as interviews to collect data about people's motivations of using given media as risk information sources.

Our research is an attempt to provide a model more powerful to predict the public's reactions to risk than other approaches. It is worthy to note that different media environment may have different performance in influencing risk perception and behavior. For example, Chung (2011) argues that since the Internet integrates into the information transmission network, it has significantly reshaped the traditional one-to-many communication. Because of its easy access and low cost, the Internet may have risk information reached a large number of people in a very short time. However, rumors might also prevail in the online environment. Therefore, the Internet could be both an opportunity and a challenge for effective risk communication. How to benefit from the information and communication technology (ICT) is the new question for experts and regulators. We also suggest designing simulation scenarios and experiments on the basis of the social-cognitive model. The content of risk information should be a major variable in such design. Affective signals can be attached to both text and vivid (image and video) contents. For example, statistics about a high association between air pollution and lung cancer, a victim's recall of a catastrophic disaster, or a photo of a damaged city after tsunami can all play the role of "fear arousal" increasing the public's risk perception and serving as a stimulus to self-protection preparedness.

As important as the implications, a few limitations of the current research must be acknowledged. The first one is related to the instruments of this research. Covello and Sandman (2001) summarized 20 attributes of risk perception in their study of the evolution of risk communication. However, our research only adopted attributes that most frequently appeared in previous studies. Instead of replicating the early research, we need to develop more innovative instruments for interpreting risk perception in the future. Regarding media exposure, hours and frequency of media usage should also be considered as measurements. Second, the setting of the environmental variable in our model is limited to the media environment. However, according to White et al. (2003), risk perception can be determined by prior attitude about the risk which might be shaped by knowledge acquisition, interpersonal discussion, social value, and many other social factors. This supports the view that media effect is limited. People may "selectively expose" to risk information that fits the judgment they already made. Therefore, the social-cognitive model should be upgraded to adjust to a more complex social context. We hope the social-cognitive model will be tested and further developed in diverse social contexts with different populations. To achieve this goal, the joint-effort from cross-disciplinary and cross-national cooperation is needed.

REFERENCES

1. Bandura, A. (1986) Social cognitive theory, *Social Foundations of Thought and Action: A Social Cognitive Theory*, Prentice-Hall, Englewood Cliffs, NJ.
2. Bandura, A. (1989) Social cognitive theory, in R. Vasta (Ed.), *Annals of Child Development* (Vol. 6. Six theories of child development, pp. 1-60), JAI Press, Greenwich, CT.
3. Bandura, A. (1997) *Self-efficacy: The exercise of control*, Worth Publishers, New York, NY.
4. Breakwell, G. M., and Barnett, J. (2003) The social amplification of risk and the layering method, in N. Pidgeon, R. E. Kasprow & P. Slovic (Eds.), *The Social Amplification of Risk* (pp. 80-101), Cambridge University Press, New York, NY.
5. Chung, I. J. (2011) Social amplification of risk in the Internet environment, *Risk Analysis*, 31, 12, 1883-1896.
6. Covello, V., and Sandman, P. M. (2001) Risk communication: Evolution and revolution, in A. Wolbarst (Ed.), *Solutions to an Environment in Peril* (pp. 164-178), John Hopkins University Press, Baltimore, Maryland.
7. Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., and Combs, B. (1978) How Safe is Safe Enough? A Psychometric Study of Attitudes Towards Technological Risks and Benefits, *Policy Sciences*, 9, 127-152.
8. Frewer, L. (2004) The public and effective risk communication, *Toxicology Letters*, 149, 391-397.

9. Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., Kasperson, J. X., and Ratick, S. (1988) The Social Amplification of Risk: A Conceptual Framework, *Risk Analysis*, 8, 2, 177-187.
10. Lang, A. (2013) Discipline in crisis? The shifting paradigm of mass communication research, *Communication Theory*, 23, 10-14.
11. Leiss, W. (1996) Three phases in the evolution of risk communication practice, *Annals of the American Academy of Political and Social Science*, 545, May, 85-94.
12. Miles, B., and Morse, S. (2007) The role of news media in natural disaster risk and recovery, *Ecological Economics*, 63, 2-3, 365-373.
13. Prati, G., Pietrantonio, L., and Zani, B. (2011) A Social-Cognitive Model of Pandemic Influenza H1N1 Risk Perception and Recommended Behaviors in Italy, *Risk Analysis*, 31, 4, 645-656.
14. Rimal, R. N. (2001) Perceived risk and self-efficacy as motivators: Understanding individuals' long-term use of health information, *Journal of Communication*, December, 633-654.
15. Schwarzer, R., and Fuchs, R. (1995) Changing risk behaviors and adopting health behaviors: The role of self-efficacy beliefs, in A. Bandura (Ed.), *Self-efficacy in Changing Societies* (pp. 259-288), Cambridge University Press, New York, NY.
16. Siegrist, M. (2010) Psychometric Paradigm, in S. H. Priest (Ed.), *Encyclopedia of Science and Technology Communication* (pp. 601-602), SAGE Publications, Inc., Thousand Oaks, CA.
17. Slovic, P. (2010) *The Feeling of Risk: New Perspectives on Risk Perception*, Taylor & Francis, New York.
18. Slovic, P., Finucane, M. L., Peters, E., and MacGregor, D. G. (2010) Risk as analysis and risk as feelings: some thoughts about affect, reason, risk and rationality, in P. Slovic (Ed.), *The Feeling of Risk: New Perspectives on Risk Perception* (pp. 21-36), Taylor & Francis, New York, NY.
19. Stern, Z. (2007) What is environmental risk?, East Austin Environmental Justice Project, The University of Texas at Austin, Austin, TX.
20. Viklund, M. J. (2003) Trust and Risk Perception in Western Europe: A Cross-National Study, *Risk Analysis*, 23, 4, 727-738.
21. Welch, M. R., Rivera, R. E. N., Conway, B. P., Yonkoski, J., Lupton, P. M., and Giancola, R. (2005) Determinants and Consequences of Social Trust, *Sociological Inquiry*, 75, 4, 453-473.
22. White, M. P., Pahl, S., Buehner, M., and Haye, A. (2003) Trust in Risky Messages: The Role of Prior Attitudes, *Risk Analysis*, 23, 4, 717-726.
23. Wood, R., and Bandura, A. (1989) Social cognitive theory of organizational management, *Academy of Management Review*, 14, 3, 361-384.