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EVALUATION OF AFFECTIVE WARNING PICTORIALS IN REDUCING RISKY SECURITY BEHAVIOURS ON THEINTERNET

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Abstract. There are somelimitations incommunication design research methodologies and processes due to the technological and social changes. Some researchers have explored the factors that influence users' behaviour, and have adopted human-centred approaches. Based onthe human-centred approach, the role of emotions in the process of obtaining information has been recognised; however, few studies have investigated how effective it is. Therefore, this study investigated the effectiveness of adopting emotional concerns in designing warning pictorials regarding security awareness. A field experiment was conducted to examine the effectiveness of designing emotional warning pictorials in communication design for security awareness. We expect that this research will serve as a starting point for optimising the security awareness on the Internet from an emotional perspective.

Keywords: *emotion, warning pictorials, communication design, affective influence.*

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1. Introduction

General research methodologies and processes for communication design adopt traditional methods. However, similar to other design disciplines, communication design is influenced by technological and social changes. Scholars understand the limits of the current design methodologies. Some researchers have explored hidden factors that influence consumer behaviour, and have adopted human-centred approaches. Those researchers have found that emotions have been recognised as an effective factor for information retrieval, which refers to activities related to obtaining information and resources (Halaweh, 2011). However, few methods examine effectiveness of emotion, particularly for communication design, in which measuring emotional feedback from an audience is difficult. Moreover,the Internet is one of the most rapid developments in communication design. It largely relies on emotional bonding and interactions among users. During the interactions driven by emotion, users are seldom aware of the security of privacy. Therefore, anemotional warning pictorial would be a solution for this case. Consequently, the investigation examines how emotion would be applied in communication design.

2. The importance of Internet security awareness

Internet security refers to the process of protecting databases, systems and networks on the Internet (Chang & Kang, 2012; Farooq & Kakakhel, 2013; Chaturvedi,

Singh, Gupta & Bhattacharya, 2014). It involves the protection of privacy and property. It is an increasingly important topic due to the rapid development of technology and the increase in the number of Internet platforms. Internet platforms are popular nowadays because of their success in providing a sense of belonging(Zhang & Gong, 2009). People are freely sharing aspects of daily life, including videos, images and texts, with the world through Internet platforms (Jin & Peng, 2010; Hardeveld, Webber & O'Hara, 2017). There is a need to remind the users to avoid providing sensitive information in the interactions via the Internet platforms (Gharibi & Shaabi, 2012). However, influenced by the emotional attachment to the Internet platforms, users seldom consider the sensitiveness of the information they uploaded (Zhang, Gong & Tian, 2010; Kumar, Gupta, Rai & Sinha, 2013). Only a few countries, such as the United States, the Netherlands, and the United Kingdom (Talib, Clark & Furnell, 2010), have provided guidelines to Internet providers regarding displaying warning messages or warning pictorials within the conversation box once their system has sensed sensitive keywords which are similar to the Internet security guidelines (Talib, Clarke & Furnell, 2013).

3. Awareness aroused by the design of warning pictorials

Based on previous studies about the role of emotion in the Internet, it created the bonding among the users and the Internet platforms through the interactions (Kamoun & Halaweh, 2014). Furthermore, it was found that over 60 per cent of the Internet content was visually driven. Therefore, the design of emotional warning pictorials is the most appropriate tool for raising awareness about security (Kim, 2012). Warning pictorials are used to provide knowledge about reducing or preventing accidents. They are also used to ensure the human safety behaviours. There are three principles that guide the considerations in the process of designing warning pictorials. The first principle is that the characteristics of a warning pictorial have to identify its objective regarding being easy to understand, attractive, and accepted by the audience. The second principle is that the characteristics should be appropriate for the situation of the receivers, such as their age, gender, occupation, and income. The third principle is that the location or placement of the warning pictorial has to be suitable for the situation.Healthcare messages often adopt similar logic. For example, South African health organisations used pictures of HIV in seminars. They found that this was an effective tool to provoke concerns and encourage participants in seminars to discuss HIV. Compared to the other conventional methods, such as written messages, pictures would be more effective to raise awareness among participants about HIV (Morley, 2004).

People in a positive emotional state are usually more aware of greater potential threats or harms from the warning signs than those in a neutral or negative emotional state (Jiamsanguanwong & Umemuro, 2014). Researchers have also found that warning pictorials on labels are easier to understand by people in a positive emotional state than those in a neutral or negative emotional state (Farke, 2011; Kim & Baek, 2015). The warning pictorial presented negative emotion perceived larger potential threats and arousal response (Wogalter, Laughery & Mayhorn, 2012). These results indicated that emotion in warning messages or emotional warning pictorials plays an important role in human understanding or human information processing (Kim, Yim, Sugumaran & Rao, 2016). Therefore, the aim of this research was to design and validate emotional warning

pictorials for Internet users to increase awareness of the risks regarding Internet security.

4. Field experiment for validating emotional warning pictorials on Internet platforms

Twenty-one warning pictorials currently used on the Internetwere collected and categorised into three emotional state groups (positive, neutral, and negative) based on the message delivered. There were seven in each emotional state group. Then, 60people from Hong Kong were invited to participate in the validation of emotional warning pictorials. The profile of the participants (Figure 1) is shown in the figure below.

- Twenty participants were graduated students between eighteen and twenty-seven years old,
- Twenty participants were invited randomly from working class between twenty-eight and thirty-seven years old,
- Twenty participants invited randomly from the working class between thirty-eight and forty-seven years old

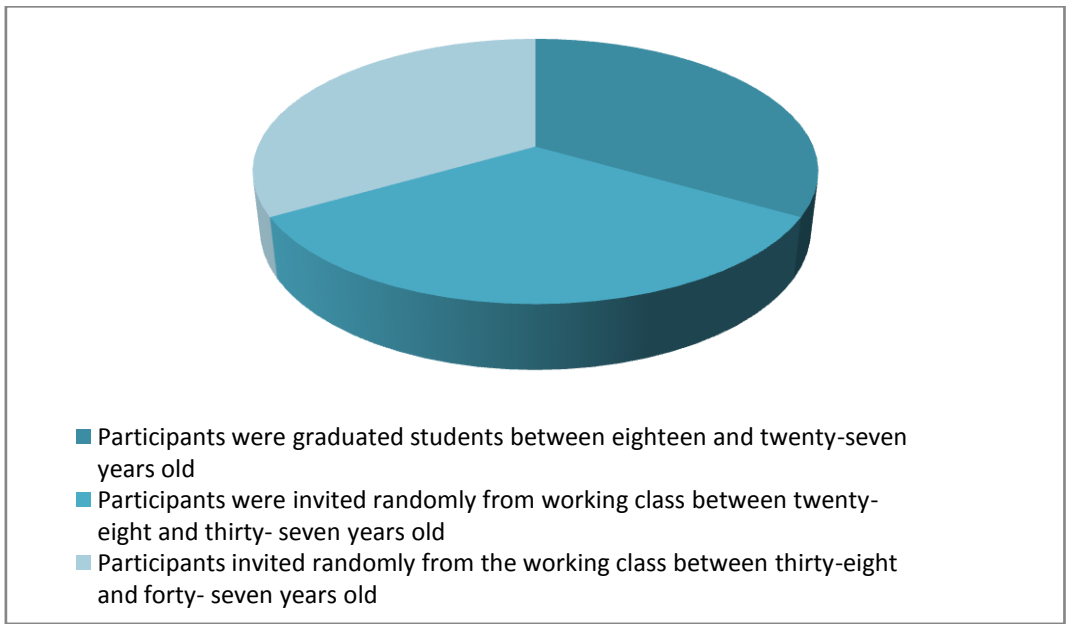

Figure 1. Profile of the participants

5. Research process

The experiment was divided into two parts. In the first part, it aimed to understand how the emotional warning pictorials on Internet platforms work. Participants were asked to agree to undergo emotional manipulation by watching pictures from the International Emotional Picture System (Lang, Bradley & Cuthbert, 1997) to adjust theiremotional state to the neutral state before starting the experiment. The Self-Assessment Manikin (Morris, 2000) was adopted to evaluate the emotional reaction of participants (with the changes in valence and arousal) after seeing each of the 21

collected emotional warning pictorials. Based on their feedback, the changes in emotion would be noticed.According to the findings of previous studies, Internet behavioursare complicated. To process information, itusually needs to be repeated or delivered as a series. Therefore, there is a need to understand how the emotional warning pictorials would contribute to the awareness of Internet security. To examine this aspect, in the second part, the emotional warning pictorials were arranged into various series (as shown in Table 1) based on their emotional state groups:

Table 1. Series arranged based on the emotional warning message applied to the second part of the research

	The Emotional State That Delivered In The First Page Message	**The Emotional State That Delivered In The Second Page Message**	**The Emotional State That Delivered In The Third Page Message**
Group 1	Positive	Neutral	Negative
Group 2	Positive	Positive	Positive
Group 3	Neutral	Neutral	Neutral
Group 4	Negative	Negative	Negative
Group 5	Positive	Neutral	Neutral
Group 6	Positive	Negative	Negative
Group 7	Neutral	Positive	Positive
Group 8	Neutral	Negative	Negative
Group 9	Negative	Positive	Positive
Group 10	Negative	Neutral	Neutral

6. Research result

The result showed that emotional warning pictorials were able to evoke a specific emotional state in participants, such as a positive, neutral, and negative state.

Table 2. Descriptive statistics: valence and arousal scores of each warning pictorial group

After Seeing Each Of 20 Emotional Warning Pictorials						
Warning pictorial group	n	Score	Max	Min	X	SD
Positive	7	Valence	8.86	2.38	4.0	1.1
		Arousal	5.33	4.02	4.9	0.4
Neutral	7	Valence	5.53	2.31	3.9	0.9
		Arousal	6.15	4.15	5.1	0.5
Negative	7	Valence	4.26	1.72	3.0	0.6
		Arousal	7.36	4.72	5.8	0.7

Based on the analyses, the findings confirmed that the emotional state of participants could be changed to specific target emotional states, including positive, neutral, and negative emotions. It was obvious that those warning pictorials in realistic style with harsh causation. Compared to others in the same group, a person in prison and a man who had been involved in a bad accident showed the lowest rating in the valencescores and a high rating in the arousalscores. The means of their arousal scores

were relatively high, which possibly implied that warning pictorials could attract more attention from the participants in a negative emotional state.

Table 3. Descriptive statistics: valence and arousal scores of the arranged warning pictorial series

After Seeing Each of Arranged Emotional Warning Pictorials Series					
	Score	Max	Min	X	SD
GROUP 1	Valence	8.86	2.38	4.0	1.1
	Arousal	5.33	4.02	4.9	0.4
GROUP 2	Valence	5.53	2.31	3.9	0.9
	Arousal	6.15	4.15	5.1	0.5
GROUP 3	Valence	4.26	1.72	3.0	0.6
	Arousal	7.36	4.72	5.8	0.7
GROUP 4	Valence	8.86	2.38	4.0	1.1
	Arousal	5.33	4.02	4.9	0.4
GROUP 5	Valence	5.53	2.31	3.9	0.9
	Arousal	5.86	2.38	4.0	1.1
GROUP 6	Valence	5.33	4.02	4.9	0.4
	Arousal	5.53	2.31	3.9	0.9
GROUP 7	Valence	4.15	4.15	5.1	0.5
	Arousal	4.26	1.72	3.0	0.6
GROUP 8	Valence	7.36	4.72	5.8	0.7
	Arousal	4.86	2.38	4.0	1.1
GROUP 9	Valence	5.33	4.02	4.9	0.4
	Arousal	5.53	2.31	3.9	0.9
GROUP 10	Valence	6.86	2.38	4.0	1.1
	Arousal	5.33	4.02	4.9	0.4

7. Conclusion

This study aimed to investigate the effectiveness of adopting emotional concerns in designing warning pictorialsregarding security awareness. Emotional warning pictorials from this research can be implemented as the security messages on the Internet platforms. 60 people from Hong Kong were invited to participate in the validation of 21 emotional warning pictorials according to three emotional state groups (i.e. positive, neutral, and negative). The findings in this study revealed that emotional warning pictorials can evoke emotional reactions of participants in the target emotional states. There are limitations in this study, however,such as the limited number of warning pictorials, the varied background of participants (for example, educational level and gender), and the understanding of the warning messages. However, the future research will be focused on the study of comprehension, risk perception, and motivation to raise security awareness among the interactions on the Internet after participants view emotional warning pictorials.

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