

Poster: Memorability of Computer Security Posters as Affected by Message Type

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1. ABSTRACT

Commonly used security awareness messages involving deterrence, morality, regret, incentive and feedback themes were found to be perceived differently in terms of their positive or negative emotional valence and arousal. These various message types were found to selectively affect memory for different elements of the visual displays used to present the messages.

2. INTRODUCTION

A frequently used security awareness strategy involves the use of visual displays, such as posters, on which security information is presented [3]. Examination of the illustrations provided in [3] reveals that common elements of such visual displays include: (a) text intended to persuade users to be aware of and/or take actions with respect to a target security risk (the message); (b) one or more visual icons directly related to the message theme (message icons); (c) additional text statements or facts not directly conveying the target message (background text); and (d) other visual elements not directly related to the target theme (background icons)

Prior research has found that memory for visual display elements can be affected by many factors including emotional responses to the display. For example, negative emotionality can selectively enhance memory for the most emotion-producing elements while reducing memory for background elements [1]. The present study was conducted to determine how five commonly used types of computer security messages would influence memory for various visual display components. It was believed that those message types with a negative emotional valence for subjects might selectively alter recollection of visual display elements. Following [1], we predicted that, compared to neutral messages devoid of emotional content, negative messages would enhance memory for the main message and possibly for its related icon, while reducing memory for background text and icons

3. METHOD

3.1 Participants and Materials

Participants were fifty college undergraduate students from a

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Symposium on Usable Privacy and Security (SOUPS) 2013, July 24–26, 2013, Newcastle, UK.

small, private Midwestern university. The primary materials for the study involved the poster display. All posters (see Fig. 1) consisted of two icons and two types of textual messages. Each computer security poster contained one of five background scenarios (File Sharing, Password Sharing, Security Updates, Phishing, Sensitive Information) presented along with an associated fact (Scenario Fact). Each background scenario was combined with one of five target messages (Deterrent, Morality, Regret, Incentive, Feedback). For the two images on each poster, one corresponded with the scenario (Scenario Icon) and one corresponded with the target message (Message Icon). The neutral posters also contained messages, facts and images, but all elements were unrelated to security.

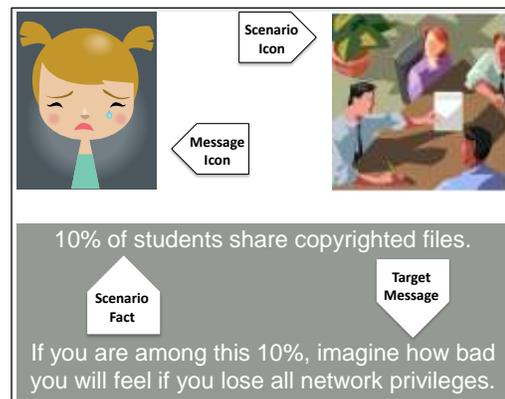


Fig. 1: A Regret poster using a File Sharing security scenario

3.2 Procedure

Participants were presented with a series of ten different posters, five related to computer security and five neutral posters for control purposes. The computer security posters contained one of the scenario types combined with one of the target message types. Each participant received a combination of posters that contained all five scenario types and all five message types. In addition, each participant received five neutral posters. All combinations were counterbalanced using orthogonal Latin squares.

Posters were displayed, one at a time, on a 60-inch LED television screen for 20 seconds, followed immediately by self-ratings for valence (positive or negative) and arousal (calming or arousing). A 20-second rest interval separated the display of each poster. This procedure continued until the participant viewed all ten posters. Approximately 24 hours after viewing the posters,

participants returned for a memory test consisting of four-alternative, forced choice questions assessing recall for the message gists, scenario facts, and icons on each of the computer security posters.

4. RESULTS

All dependent measures were computed as the percent change from the average responses given to the five neutral posters. A neutral rating on the 7-point valence/arousal scale was 4.0, and the Neutral posters averaged 4.2 and 4.7, respectively. Fig. 2 shows the mean valence and arousal for each message type. Positive numbers mean a more positive valence or a more arousing reaction for these posters than for those that were neutral, while negative numbers mean the opposite. Compared to the valence of neutral slides, Deterrent, Regret, and Feedback messages were rated as more negative, while Morality and Incentive were rated as more positive. Deterrent and Regret were not significantly different but both differed from Feedback (all $ps < .05$ using Bonferroni correction for multiple comparisons). Also, compared to Neutral posters, Morality and Feedback were more calming, whereas Deterrent, Regret and Incentive were more arousing. Regret differed significantly in arousal from all other message types (all $ps < .05$), but neither of the other two pairs differed.

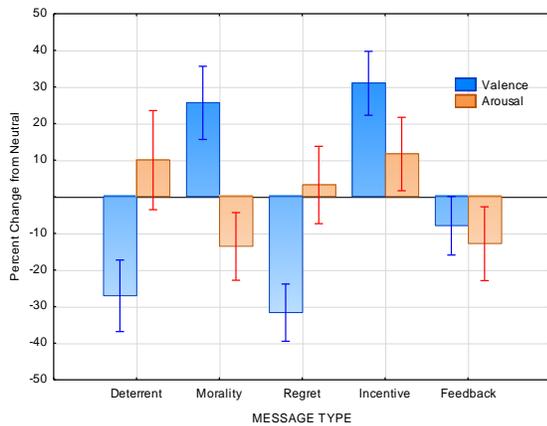


Fig. 2: Relative Valence/Arousal Ratings by Message Type

Fig. 3 shows memory recall performance for the four poster elements expressed as a percentage of recall for those same items on neutral posters. Positive numbers mean that memory performance improved relative to neutral posters, while negative numbers signify the opposite. Several observations are apparent from this figure. First, memory for Message Gist and Scenario Facts was worse for all message types relative to that for Neutral posters. There were no significant differences among message types for recall of Message Gist, but the decrease in recall for Deterrent, Morality, and Regret Facts all were worse than that for Incentive and Feedback Facts (all $ps < .05$). Second, memory for Message Icons improved relative to Neutral posters for all message types, but significantly more so for Regret and Feedback than for the other message types ($ps < .05$). Third, recall for security icons decreased relative to Neutral posters for Regret, Morality, and Deterrent message types, but significantly more for the latter ($p < .05$).

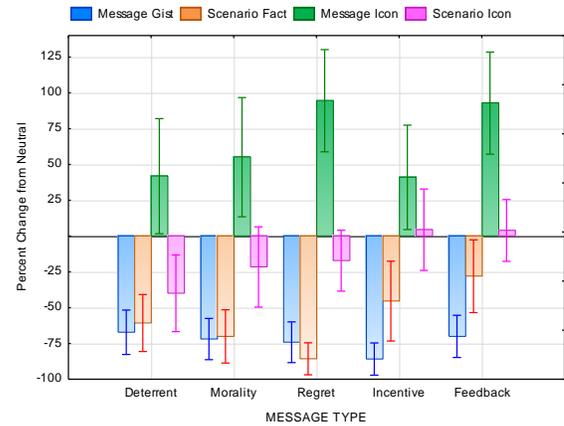


Fig. 3: Relative Memory Performance by Message Type

5. DISCUSSION

There are several important conclusions here. First, in relation to Neutral messages, Deterrent and Regret were perceived as negative, Morality and Incentive were viewed as positive, and Feedback was close to neutral. Second, relative to Neutral posters, perceived arousal did not align with valence as evidenced by the fact that Deterrent and Incentive messages were arousing, Feedback and Incentive were calming, and Regret was nearly neutral. Third, the five message types examined here did indeed exert selective effects on memory performance, but not as predicted. All message types enhanced memory for the Message Icon, decreased memory for Message Gist and Security Facts, but had mixed effects on recall for Security Icons. The message type perceived as most negative (Regret), depressed gist and fact recall, but produced one of the largest enhancements of Message Icon memory. However, the Feedback message, which was only slightly negative, also greatly enhanced recall for the Message Icon, while having a lesser diminishing effect on gist and fact recall. One implication of these results is that deterrent themes, which are often considered a best practice in security awareness efforts [2], may not be the most optimal approach for changing individuals' security behaviors. More research will be needed to better understand the effects of message type on selective memory for various poster elements. Future work also will explore psychophysiological measures of arousal as they relate to memorability and valence of security posters.

6. ACKNOWLEDGMENTS

This research was supported National Science Foundation under Grant No. IIS09-15775.

7. REFERENCES

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