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Affect Feedback during Crisis and Its Role in Improving IS Utilization

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1. Introduction

After 9/11, researchers began to investigate how people under stress make decisions and how systems could be enhanced to help improve their decisions. Of particular interest has been government agencies (Henninger et al. 2003) and emergency responders, such as police, paramedics, and others involved in first response efforts. These responders often face making decisions under uncertainty and stressful environments (Sayegh et al. 2004; Staw et al. 1981). This often means making decisions under a limited amount of time and requires responders to process large amounts of information to make the best decision possible. Information systems (IS) and their effective usage thus become increasingly important in such situations where timely and accurate decisions under extreme time constraints are critical (Turoff et al. 2004). Research also reveals that one's affective states (feelings and emotions) plays a critical role in a person's ability to make sound judgments (Hanoch 2002). Further one's ability to maintain positive affect can enable one to better cope with stress and the ability to integrate information more effectively in complex decisions (Isen 2008)

911 operators are often the first person "on the scene" and thus encounter many stressful situations on a daily basis. They provide the first link a victim or witness has to an emergency responder. Most 911 operation centers use Computer Aided Dispatch (CAD) systems to assist 911 operators in taking information from the caller and making the best decision for how to classify the call and subsequently dispatch the police or fire responders. Additional systems used often include answering platforms, digital mapping applications, digital logging recorders, and management systems.

This research looks at a portion of a larger researcher question, which is **does including affect feedback into an existing 911 call taking process improve IS utilization?** The first step is to look at the impact of affect feedback in a controlled environment so that possible issues that could arise can be mitigated early on before actual implementation in call center is performed. This paper focuses on the first step, a controlled laboratory experiment, which is explained in the methodology section of this extended abstract.

2. Literature Review

Affect is describes one's feelings, moods, or emotions. Further, studies reveal that positive and negative affect are not opposite points on a singular axis (Isen 2003; Isen et al. 2003; Larsen et al. 2003). They have different theoretical backgrounds and impact on behavior. According to positive affect theory, positive affect cues positive material (Fredrickson 2003; Fredrickson et al. 2005; Isen 1984; Isen et al. 2003) in one's mind. Since the network of positive cognitive material in one's memory is diverse, elaborately connected, and flexible, when one is in a positive feeling state s/he has access to an abundant amount of quality thoughts to aid in his/her cognitive processes (Aspinwall 1998; Fredrickson 2003; Fredrickson et al. 2000; Isen 2003). According to this theory, these effects including cognitive flexibility, better integration of new information, effective thinking, and increased creativity and innovation

are attributed to discerning unusual but useful relationships which are all linked to increased dopamine level in the brain's anterior cingulate region.

Given that crisis situations require people, especially "first responders" to process complex thoughts and stimuli in many different ways in order to accurately judge the situation and come up with an ultimate decision, people in positive mood would appear to be better equipped to handle complex decisions. In other words, they are more able to process complex information, because they have a higher capacity to connect the perceptions of the stimulus in different ways (Schroder, Driver, and Streufert, 1967). People in a positive affective state exhibit flexibility in integrating new information and are less likely to ignore or distort information not supporting the solution they were considering (Estrada et al 1997). Thus, it is likely that positive affect can help decision makers to be less rigid in their responses. Finally, people in positive affect tend to have more constructive strategies to cope with stressful situations and negative events (Aspinwall 1998). Because positive mood serves as an "emotional currency" (Aspinwall 1998) it has the potential to help alleviate the stress experienced in a crisis decision environment.

IS are often implemented to assist users in decision making, however literature suggests that computerized decision aids are not always used effectively (Benbasat et al. 1996; Todd et al. 1992). Further research suggests, however, that users' positive affect has a significant influence on how effectively information technologies are used (Djamasbi 2007) and that experiencing positive affect may help users utilize IS more effectively (Djamasbi et al. 2008). Since emergency situations often require fast decision making, it is likely that they may result in even less effective usage of IS by first response users (e.g., due to time limit) as well. Since experiencing positive affect has been shown to enhance IS usage under time limit (Djamasbi et al. 2008) ,it is likely that decision makers can benefit from their positive affect during a crisis.

In order to measure affect, several self-report measures exist , such as PANAS (Watson et al. 1988) or the scale developed by (Elsbach et al. 1999). However, recent advances in physiological and medical research reveal that muscular and heart rate variability measures can reliably measure one's affect. In particular, heart rate variability (HRV) can be extracted and converted to one's heart rhythm coherence (Djamasbi et al. 2008; McCraty et al. 2006) which appears to correspond to one's affective state (demonstrated by an increased synchronization between heart and brain synchronization). Current devices are all wired systems that require the user to be tethered to it.

3. Research Question

The specific question then becomes: **Does including affect feedback into crisis environment, war games, improve performance?**

4. Methodology

In order to investigate this question, several steps will be conducted. First, a wireless HRV device will be developed along with a visual affect feedback system likely to inform the user of their level of positive affective state.. Second, it will be tested on students using war game scenarios to ensure that affective states (positive affect) are accurately collected through the device. Third, the students will be taught to interpret the affective feedback and how to manipulate it (i.e., receive affect management training). Fourth, the affect feedback application will be incorporated into the war game. Through an additional laboratory experiment, we will collect additional data to determine the effectiveness of the affect feedback feature on performance.

Fifty subjects will be randomly assigned to two groups which all play the war game in two periods of times approximately 15 minutes each. In the first period all fifty subjects will play the war game. Then half of the subjects will be trained in affect management (experimental group). In the second again all will play the game but only those that received the affect management training will use the affect feedback feature.

5. Analysis

We will use t-tests to compare the average performance of subjects in the experimental and control group. Additionally we will use pair t-tests to compare the pre-and post performances of those who received affect training.

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