

*Djamasbi, S., Loiacono, E.T., Mendelson, Y. "Affect Feedback during Crisis and its Role in Improving IS Utilization," in Proceedings of the 7th International Conference on Information Systems for Crisis Response and Management (ISCRAM), Washington, Seattle, 2010, pp. 1-5.*

# **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 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.

## 6. References

- Aspinwall, L.G. "Rethinking the Role of Positive Affect and Self-Regulation," *Motivation and Emotion* (22:1), March 1998, pp 1-32.
- Benbasat, I., and Todd, P. "The Effects of Decision Support and Task Contingencies on Model Formulation: A Cognitive Perspective," *Decision Support Systems* (17:4), August 1996, pp 241-252.
- Djamasbi, S., Tullis, T., Hsu, J., Mazuera, E., Osberg, K., and Bosch, J. "Gender Preferences in Web Design: Usability Testing through Eye Tracking," *Proceedings of the 13th Americas Conference on Information Systems*, Keystone, Colorado, 2007.
- Djamasbi, S., Tulu, B., Loiacono, E., and Whitefleet-Smith, J. "Can a Reasonable Time Limit Improve the Effective Usage of a Computerized Decision Aid?," *Communications of the AIS* (23:Article 22) 2008b.
- Elsbach, K., and Barr, P. "The Effects of Mood on Individual's Use of Structured Decision Protocols.," *Organization Science* (10:2), March/April 1999, pp 181-198.
- Estrada, C.A., and Isen, A.M. "Positive Affect Facilitates Integration of Information and Decreases Anchoring in Reasoning among Physicians," *Organizational Behavior & Human Decision Processes* (72:1), October 1997, pp 117-136.
- Fredrickson, B.L. "Positive Emotions and Upward Spirals in Organizations," in: *Positive Organizational Scholarship*, K.S. Cameron, J.E. Dutton and R.E. Quinn (eds.), Berrett-Koehler Publishers, Inc., San Francisco, 2003, pp. 163-175.
- Fredrickson, B.L., and Losada, M.F. "Positive Affect and the Complex Dynamics of Human Flourishing," *American Psychologist* (60:7), October 2005, pp 678-686.
- Fredrickson, B.L., Mancuso, R.A., Branigan, C., and Tugade, M.M. "The Undoing Effect of Positive Emotion," *Motivation and Emotion* (24:4), December 2000, pp 237-258.
- Hanoch, Y. "Neither an Angle nor an Ant: Emotion as an Aid to Bounded Rationality," *Journal of Economic Psychology* (23:1), February 2002, pp 1-25.
- Henninger, A., Jones, R., and Chown, E. "Behaviors that Emerge from Emotion and Cognition: Implementation and Evaluation of a Symbolic-Connectionist Architecture," *International Conference on Autonomous Agents Melbourne, Australia, 2003*, pp. 321-328.
- Isen, A.M. "Some Ways in Which Positive Affect Influences Decision Making and Problem Solving," in: *Handbook of Emotions*, M. Lewis (ed.), Guilford Press, New York, NY, 2008, pp. 548-586.
- Isen, A.M. "Towards Understanding the Role of Affect in Cognition," in: *Handbook of Social Cognition*, R.S. Wyer and T.K. Srull (eds.), Erlbaum, Hillsdale, NJ, 1984, pp. 179-236.
- Isen, A.M. "Positive Affect as a Source of Human Strength," in: *A Psychology of Human Strengths*, L. Aspinwall and U.M. Staudinger (eds.), American Psychological Associations, Washington, DC, 2003.
- Isen, A.M. "Some Ways in Which Positive Affect Influences Decision Making and Problem Solving," in: *Handbook of Emotions*, M. Lewis (ed.), Guilford Press, New York, NY, 2008, pp. 548-586.
- Isen, A.M., and Labroo, A.A. "Some Ways in Which Positive Affect Facilitates Decision Making and Judgment," in: *Emerging Perspectives on Judgment and Decision Research*, L.S. Schneider and J. Shanteau (eds.), Cambridge University Press, Cambridge, UK, 2003, pp. 365-393.
- Larsen, J.T., Hemenover, S.H., Norris, C.J., and Cacioppo, J.T. "Turning Adversity to Advantage: On the Virtues of the Coactivation of Positive and Negative Emotions," in: *A Psychology of Human Strengths*, L. Aspinwall and U.M. Staudinger (eds.), American Psychological Association, Washington, DC, 2003.
- McCraty, R., Atkinson, M., Tomasino, D., and Bradley, R.T. *The Coherent Heart: Heart-Brain Interactions, Psychophysiological Coherence, and the Emergence of System-Wide Order* Institute of HeartMath, Boulder Creek, California, 2006, pp. 1-64.

- Sayegh, L., Anthony, W.P., and Perrewé, P.L. "Managerial Decision-Making Under Crisis: The Role of Emotion in an Intuitive Decision Process," *Human Resource Management Review* (14:2), June 2004, pp 179-200.
- Schroder, H.M., Driver, J.J., and Streufert, S. *Human Information Processing* Holt, Rinehart, and Winston Inc., New York, 1967, pp. 54-61.
- Staw, B., Sandelands, I., and Dutton, J. "Threat-Rigidity Effects in Organizational Behavior: A Multilevel Analysis," *Administrative Science Quarterly* (26) 1981, pp 501-524.
- Todd, P., and Benbasat, I. "The Use of Information in Decision Making: An Experimental Investigation of the Impact of Computer Based Decision Aids," *MIS Quarterly* (16:3), September 1992, pp 373-393.
- Turoff, M., Chumer, M., and Van de Walle, B. "The Design of a Dynamic Emergency Response Management Information System (DERMIS)," *Journal of Information Technology Theory and Applications* 2004.