

## EGSS 2012 Conference

### (e)Merging Knowledges: Classroom, Community, Culture

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**Presentation Title:** Co-Occurring Emotions: Building an Understanding of Parallel-Emotional Processing and its Applications to Learning and Education with Intelligent Tutoring Systems

**Special Requirements:** None.

**Author Biographies:**

Jason Harley is a first year Ph.D. student in the Learning Sciences at McGill University. He is interested in learners' emotional responses to pedagogical agents scaffolding strategies and in the design of emotionally adaptive intelligent tutoring systems. Jason's research also examines co-occurring emotions, emotional regulation, and the convergence of affective data streams.

François Bouchet received a Master's degree in Engineering from ESIEA and in Computer Science from University Paris-South 11 in 2005 and 2006, respectively, and a PhD in Computer Science from University Paris-South 11 in 2010. He is now a postdoctoral fellow at McGill University, working on Agent-based Intelligent Tutoring Systems.

Roger Azevedo is a Professor and Senior Canada Research Chair at McGill University. His main research areas include examining the role of cognitive, metacognitive, affective, and motivational self-regulatory processes during learning with computer-based learning environments. He has published over 100 peer-reviewed papers in the educational, learning, and cognitive sciences.

**Title:** Co-Occurring Emotions: Building an Understanding of Parallel-Emotional Processing and its Applications to Learning and Education with Intelligent Tutoring Systems

### **Abstract**

Currently, very little is known about co-occurring (i.e., parallel) emotional states, despite several researchers accounting for them in theories and identifying them as crucial to the cross-disciplinary understanding and measurement of emotions as well as in the programming of emotionally-adaptive intelligent tutoring systems (ITS) (Conati, 2009; Ekman & Friesen, 1971; Pekrun, 2006). This paper expands upon the traditional emotional measurement and conceptual framework in which emotions are analyzed and reported as single, discrete psychological experiences by: (1) using a novel methodological trace-data approach in which co-occurring emotions are examined using an automatic facial recognition program, FaceReader 4.0; (2) measuring state-transitions between single and co-occurring emotions (e.g., “neutral” to “happy and surprised” to “scared”); and (3) examining co-occurring emotional antecedents (e.g., pedagogical agent feedback). In the paper we discuss our findings and the theoretical conclusions we can draw from them, in particular, whether there are multiple identifiable ‘types’ of co-occurring emotions (e.g., hybrid states, transition-based, or competing or complimentary goal/stimuli-directed states?). The implications these results have for the development of emotionally adaptive ITS and their future implementation as classroom and homework teaching assistants (i.e., tutors) will be discussed. **[187 words / 200 word cap]**

### **Synopsis**

This experimental study examined the embodiment of single and co-occurring emotional states as well as state-transitions, and emotional antecedents. Emotions were analyzed using a novel methodological trace-data approach, which included the automatic facial recognition program, FaceReader 4.0. Results provide theoretical as well as practical (e.g., educational) implications and future directions. **[50 words / 50 word cap]**