Connecting to the Future, feeling better in the present: Academic achievement emotions, future oriented value, and arousal.

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According to Control Value Theory, valuing an activity intensifies emotional responses (Pekrun, 2006) yet not all value is created equal. Limited prior research suggests that students recover more effectively from strong emotional responses when they see connections between the course content and their valued future goals (Turner & Schallert, 2001). The pupose of this study is to explore the relations between students' emotional response to an exam and their valuing of the course.

To explore students' response to testing situations we utilize a salivary biomarker **salivary Alpha Amylase (sAA).** Levels of sAA increase when individuals experience psychological stress or anxiety (Nater & Rohleder, 2009). Although sAA is a reliable objective marker of affective arousal, it does not indicate the valence of students' emotional response. To complement sAA, students' self-reported **Academic achievement emotions** were collected. Specifically, hope, hopelessness, shame, and relief were examined. Students were asked about their academic emotions while collecting saliva samples during a performance task for an engineering course in order to examine students' emotional experience over the course of an exam, allowing us to examine relations between emotions and course valuing in real time.

Methods

One week prior to their midterm, participants (N=48) took a practice exam which paralleled the midterm in the number, content, and difficulty level. Participants provided survey responses and salivary samples immediately prior to, during, immediately after, and 20 minutes after the practice exam.

Measures

Specific Academic emotions were measured using Academic Emotions Questionnaire (Pekrun, et al., 2011). As a measure of total sAA output, area under the curve with respect to ground was calculated using a trapezoidal formula composed of the measured sAA values and timestamps embedded in the assessment (Pruessner, 2003). Recovery was indicated by the difference between post and 20min after post-test sAA levels. Students' valuing of the course was measured

by the Perceptions of Instrumentality scale (Hilpert, et al., 2012).

Results

We conducted longitudinal k-mean cluster analysis in *R* software (*R Core Team, 2012)* using the *KML* package (Genolini, et al., 2013). Our results suggest that a 2-cluster model best fit the data (see Figure 1). Cluster B had a more pronounced physiological response to the practice exam. Relations between academic emotions, sAA level, recovery, and both pre- and post-test differed for these two groups. For the cluster A, minimal arousal during the exam, sAA level was not statistically significantly related to pre-test hopelessness, hope, post-test relief, or perceptions of instrumentality. Recovery was also not related to perceptions of instrumentality. Cluster B, more pronounced physiological response, sAA level was related to pre-test hopelessness (r=.52; p<.05); pre-test hope (r=-.46; p<.05) and post-test relief (r=.53; p<05). Post-test shame was not significantly related to sAA level (r=-.30; p>.05) or recovery (r=-.06; p>.05). Additionally, post-test sAA recovery was significantly and positively related to individual's perception of instrumentality (r=.49; p<.05). PI was not related to sAA level (r=.05; p>.05).

Discussion

This research provides insight into the complex relationship between value and emotional arousal, and recommendations for future research using physiological measures of arousal.

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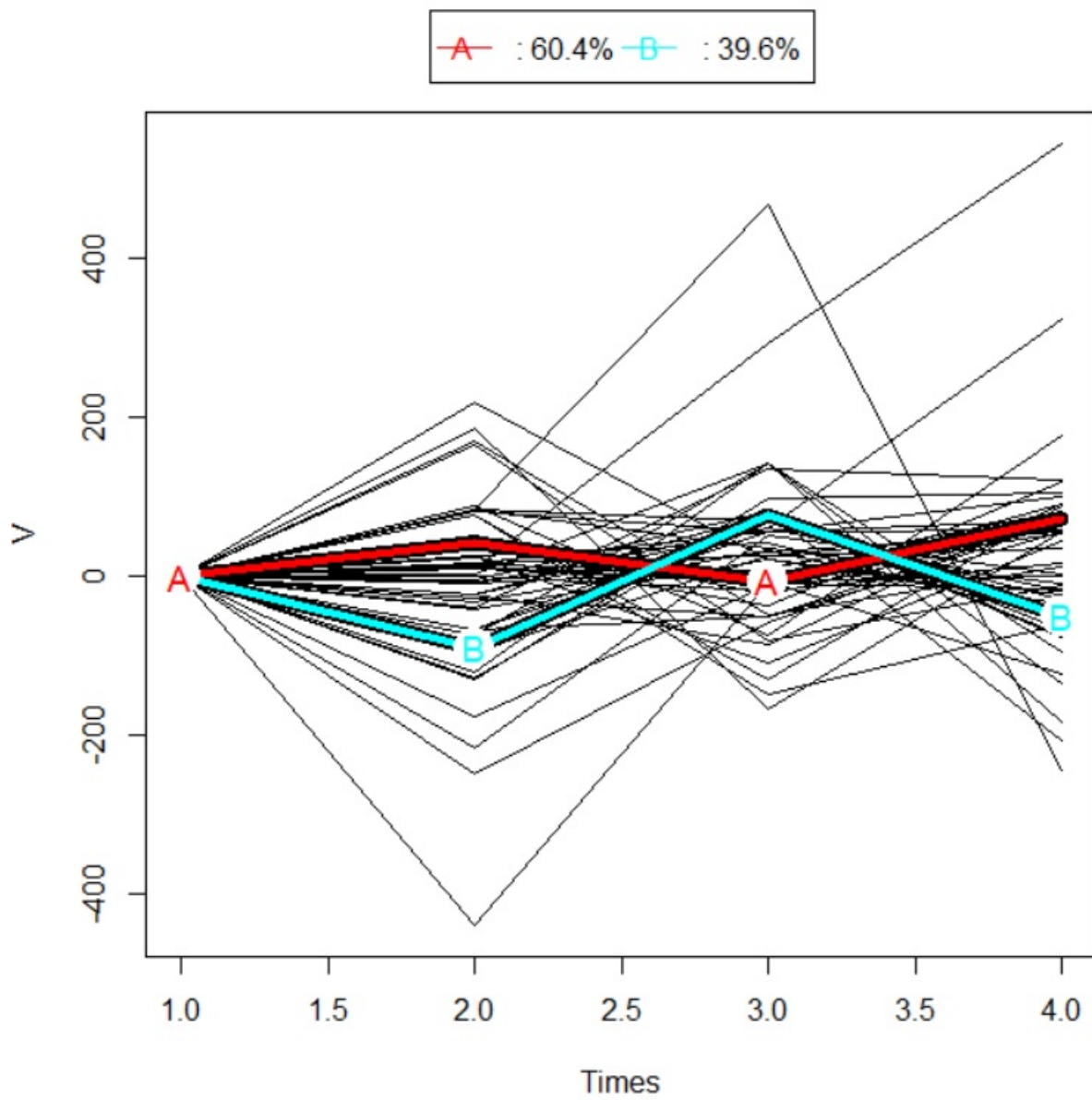
Figure 1. Plot means for KML two-cluster model with individual growth curves centered on intercept