Honors Thesis Proposal

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The Effect of Student Emotional Maturity on Their Perception of Test Question Fairness: an fMRI and Focus Group Study

A. Project Purpose.

This project will examine the relationship between a student's emotional maturity (EQ) and their perception of test question fairness. We hypothesize that students with higher EQ will view assessment questions as more fair and will show less emotional response and more logical thought processes when determining fairness. We will also examine brain activation in individuals using functional MRI (fMRI) as they determine fairness of test questions. We hypothesize that individuals with lower EQ will exhibit more emotional responses to unfairness as shown through activation of the limbic system, where more emotionally mature individuals will exhibit more prefrontal cortex activation when determining test question fairness. This research will help educators better understand how students of varying EQ respond to the fairness of assessments.

B. Project Importance.

In educational institutions, professors and students work together to learn; yet this relationship is not always viewed as fair by both parties. Student satisfaction with courses is highly correlated with their perception of fair grading procedures (Wendorf, 2004). On the other hand, professor satisfaction is highly correlated with fair student-professor interactions (Chory-Assad, 2002). Students' perception of fair grading procedures is inversely related to their aggression towards professors (Chory-Assad, 2002). By improving course grading procedures,

student-professor interactions can be improved and provide a more cohesive learning environment. Course grading procedures can be made more fair by establishing which question formats are most appropriate for students of different emotional maturity levels.

Emotional intelligence tests have been used to predict performance on cognitive decision-making tasks and academic tests (Iannucci, 2014). The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) has successfully been used to predict academic performance in university level students (Mayer, 2009). Although emotional maturity tests are very effective in predicting academic performance, it is not successful in predicting academic success factors such as participation in extracurricular activities, GPA or class attendance (Iannucci, 2014). Because the MSCEIT is very effective in predicting academic performance, this test will be used to establish the emotional maturity of test subjects.

As shown by the National Board of Medical Examiners (NBME), different styles of questions are more or less effective in assessing knowledge (NBME, 2003). One-best-answer questions or multiple-choice questions prove to be significantly more clear for students and show better assessment of knowledge. True/false questions or negatively worded questions on the other hand, are more confusing and less effective at accurately assessing students (NBME, 2003). While we know which question formats are more effective, research has not shown if different question formats are more effective for students of differing emotional maturity levels and if different areas of the brain are activated between people of varying emotional maturity.

Student satisfaction with and motivation towards different classes is strongly correlated with their perception of fair assessment procedures. On the other hand, professor satisfaction is highly correlated with their perception of fair instructor-student interactions. EQ may play into the disconnect between professors and students. An EQ test such as the MSCEIT can help

predict academic performance in students. Satisfaction with assessment methods may also be correlated with question formats used. As shown by the NBME, true/false or negative sense questions can prove less clear than multiple-choice questions. By using the MSCEIT to establish emotional maturity and fMRI to examine brain activation, we hope to find a correlation between EQ and brain activation location when determining assessment question fairness.

C. Project Overview.

Purpose

This research will help educators better understand students' perception of assessment fairness. It is hoped that this will lead to more fair interactions between educators and students in regards to assessments.

Previous Research

Preliminary fMRI research has shown that different neural circuits exist for determining different types of fairness. Pilot focus groups also suggest that EQ may not play as big of a role in fairness ratings of assessment questions as previously hypothesized. Instead, a students' educational background (undergraduate major) tends to have a more significant influence on their rating of assessment question fairness. Further data collection and analysis will help confirm or adjust these initial findings.

Methods Section

Subject will be recruited via email. Individuals will be briefed on our two-part study and will be invited to complete Part 1 only or both Part 1 and Part 2 as described below. Part 1 only

will consist of two online tests and an in-person focus group. Subjects wishing to participate in both parts will complete the two online tests as described in Part 1, then an MRI as described in Part 2, followed by the focus group and then a follow up MRI. The follow MRI is to account for changes in perception of fairness based on peer biases.

Part 1: Upon obtaining consent, each subject will be assigned a unique ID code that de-identifies his/her data. The ID code will not be associated with any contact information, other than the person's name until the surveys and focus group are completed. The ID code will link data from the surveys to the focus group participation. Subjects will be asked to complete the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) and a reading comprehension test. After completing both tests online, the subject will participate in a focus group with approximately 4 other subjects. During the focus group, the subjects will be asked questions to evaluate their perception of the difficulty and fairness of certain test questions contained in the reading comprehension test.

Part 2: Subjects will enter the BYU MRI Research Facility and will complete a screening form. After screening, subjects will enter the MRI scanner. Subjects will be presented epochs of a visual baseline scan and questions from the reading comprehension test and will be asked to determine if the questions were fair or unfair. The baseline scan of fairness will consist of a modified Ultimatum Game where subjects will be offered varying amounts of foods from an imaginary player. They will choose if each offer is fair or unfair. This test is used to establish baseline brain activation when asked to label something as fair or unfair. After completing the Ultimatum Game, subjects will be shown each question from the reading comprehension test. Subjects will use a push-button box to label each question as fair or unfair. Breaks will be

offered between each set of scans, should the subject become restless or uncomfortable. Each visit will take no more than 1.5 hours.

D. Thesis Advisors.

Advisor: Jonathan J. Wisco PhD

I have worked in Dr. Wisco's lab for the past year and a half and as a TA for his PDBio 220 class for the past 3 years. We have worked together to change our teaching and training curriculum for a group of approximately 80 TAs to fit with better pedagogical theory. Dr. Wisco completed a fellowship in Medical Education at UCLA and as such is very qualified to guide me in an education based research project. He also completed a fellowship in Neuroradiology and has experience with fMRI.

2nd Reader: Brock C. Kirwan PhD

I took an advanced fMRI techniques class from Dr. Kirwan last semester. As one of the directors of the BYU MRI Research Facility, he helped me in my data collection and is well prepared to help me fully understand my fMRI data results. His class taught me the physics of fMRI as well as how to process and analyze fMRI results. One of his graduate students also helped me in the actual data collection for my thesis.

E. Project Timeline. *Sketch the timetable you've set for producing the thesis/project, including when you aim to finish.*

September 30: Focus Group Data Analyzed

November 1: Thesis Rough Draft

November 30: Thesis Final Draft

February 1: Thesis Defense

March 1: Final Thesis Copy Uploaded

F. IRB Approval.

IRB approval was required for this research. The appropriate approval forms are included below. Part 1 is under IRB code X15023, PI: Sarah Nguyen and Part 2 is under IRB code X15265, PI: Sarah Nguyen.

L. References Section

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