

Multidisciplinary research Initiation Grant (MIG)
Office of the Vice President for Research

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STUDY APPLICATION

Title: **Neural and cognitive control of emotional content**

Principal Investigator: John Lutterbie

Department: Theatre Arts

Co-Investigators and Departments:

Hoi-Chung Leung, Psychology

Suparna Rajaram, Psychology

Summary: (Not to exceed 200 words)

This proposal investigates the neural and cognitive mechanisms involved in the processing of emotional information. This interdisciplinary approach across the sciences and the humanities investigates emotional regulation by combining the domains of behavioral cognition, neuroscience, and theater training. A study of distraction regulation both during the initial experiencing of emotional information and during its later re-processing (i.e., adaptation) provides the framework for testing a) how training can modify emotional and cognitive control and b) the underlying neural substrates. The seed grant will allow us to explore a new direction that has potential significance to basic neuroimaging, understanding the cognitive control of memory applicable to a range of clinical populations, and for improving the training of actors. In using two populations, actors and non-actors, we expect a) to observe reductions in activation in brain areas associated with language processing that will be comparable between the two groups, and b) a sharper adaptation effect in actors compared with non-actors in the prefrontal and subcortical areas implicated in emotional regulation. This multi-disciplinary study will exploit behavioral and neuroimaging paradigms and capitalize on the experience of the co-investigators in related cognitive behavioral (Rajaram), neuroimaging (Leung), and actor-training (Lutterbie) domains.

Abstract

This interdisciplinary project will investigate the neural and cognitive mechanisms involved in the processing of emotional information and how they differ in non-actors, who have no special training in responding to emotional cues, and actors, who have. It seeks to demonstrate that the brain regions involved in emotional information processing adapt to repeating stimulation; and the degree of neural adaptation in the processing of repeated emotional content differs as a function of differential skills (actors versus non-actors). There are four primary aims: 1) investigate the neural and cognitive mechanisms involved in the processing of emotional information; 2) determine how training can modify emotional and cognitive control; 3) identify the underlying neural substrates; and 4) provide preliminary evidence for evaluating the methods used in training actors.

We propose to undertake three experiments. The first is to determine whether initial processing of emotional information is compromised by different kinds of distraction; the second is a behavioral study to test how repetition or re-processing will affect reading time and rating; and the third employs fMRI imaging to determine whether the brain regions involved in emotional information processing adapt to repeating stimulation and whether the degree of neural adaptation differs as a function of differential skills (actors versus non-actors) at processing repeating emotional content under various degrees of distraction.

We expect to observe reductions in activation in brain areas associated with language processing such as the left inferior frontal gyrus, superior temporal gyrus, and inferior parietal cortex and these reductions are expected to be comparable between the two groups. In contrast, we expect to observe a sharper adaptation effect in actors compared with non-actors in the prefrontal and subcortical areas implicated in emotional regulation. Since few or no studies have examined the adaptation effect of written emotional sentences under conditions of variable distraction, any finding would be novel and contribute to the field of cognitive and affective neuroscience. Thus, the seed grant will allow us to explore a new topic that not only has potential significance to basic neuroimaging, but also has potential implications in probing cognitive control of memory in a more natural setting (reading comprehension and repetition) that can be applied to a range of clinical populations. The findings also have significant potential for improving the training of actors. A better understanding of the neural and cognitive processes that aid in memorization of lines and the significance of emotional content in the learning process will provide concrete foundation for enhancing the actor's creative process by promoting techniques that are more productive and efficient.

Evidence on the role of training in the control of emotional experiences will advance our understanding in three critical and related ways: a) by providing the seed empirical base for more elaborative investigation of effects of training, b) by enhancing our theoretical understanding of the cognitive and neural bases of emotional control, and c) by initiating an evidence-based approach aimed at eventually developing interventions that can improve the regulation of emotional processing in clinical populations.

We believe the findings of this project will be of central interest to agencies such as the National Institutes of Mental Health that funds work on anxiety, depression, addiction, and post-traumatic stress disorders, the National Institute of Drug Abuse that funds research on cognitive and emotional control, and the National Institute of Aging that funds work on emotional and cognitive regulation as a function of healthy aging. Our aim is to use the preliminary data from the proposed study to mount a collaborative R01 application.