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### Personal Information

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### Conference Details

Communication Type: Poster

Date:5/1/2018

Total Expense (USD): \$1688

Location: Santa Fe, NM

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Conference Title: Annual Meeting of the Society for the Neural Control of Movement 2018

**Communication Title:** Reorganizing muscle coordination using mental imagery and augmented visual feedback

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## ABSTRACT

Understanding how muscle coordination can be reorganized to produce skilled motor actions is key to motor learning and motor control. This is especially important in the case of movement disability e.g. in stroke. Stroke survivors exhibit muscle weakness and poor muscle coordination, which eventually results in incorrect movement patterns. Mental imagery and augmented visual feedback are strategies widely used to teach skilled movements in real-world motor skill learning. The results to be presented at the conference will examine the impact of these two strategies on muscle coordination when learning a new task in the laboratory setting.

We designed a myocontrol reaching task where the activity of 4 pairs of arm muscles was programmed to move a cursor presented on the computer screen. Participants were college-aged adults who were divided into one of three groups: controls, mental imagery intervention, augmented visual feedback intervention. The mapping of muscle activity to cursor position was intentionally complex so as to ensure participants would not learn the task quickly without any interventions.

In the mental imagery condition, participants were asked to move the cursor by imagining their arm as a joystick that needed to be moved forcefully. This was expected to activate the correct pairs of muscles necessary to ensure task success. In the augmented visual feedback condition, participants were shown the activity of their muscles as they moved the cursor on the screen.

We hypothesized that mental imagery enables faster learning than augmented visual feedback because participants learn to reorganize their muscle coordination. Preliminary results showed a trend towards changing muscle coordination with mental imagery practice. The results of this experiment will provide the basis for further experiments on chronic stroke survivors to explore the effects of mental imagery and augmented visual feedback on reorganization of muscle coordination patterns. Additionally, the use of a myocontrol interface to study the effects of mental imagery is novel, and will aid in the development of a model for understanding neural mechanisms of mental imagery.

Application must not exceed two pages and must be submitted as a pdf file to [pda@grad.msu.edu](mailto:pda@grad.msu.edu)

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Applications that do not respect these criteria will not be considered for the MSU PDA travel award.

## COMMUNICATION OUTCOMES

My research at MSU is focused on understanding the effects of stroke on movement disability, and in developing non-invasive solutions for stroke rehabilitation. I have developed this project based on my PI's research background, along with my doctoral work to bring together questions in the field of motor control and solutions from real-world skill learning. I have presented preliminary findings from this line of research at a Kinesiology departmental seminar, and used this methodology to submit a grant to the American Health Association. Complete results from this work have the potential to impact the quality of life of stroke survivors who have difficulties completing activities of daily living efficiently and successfully. Additionally, results from this work will be used in applying for an NIH grant in Fall 2018.

The Society for the Neural Control of Movement (NCM) presents a relatively small group of researchers whose main goal is to understand the basis of movement, and to develop solutions for movement disorders. My research philosophy is intertwined with the mission of NCM due to my interest in understanding the neural basis of movement by studying problems that arise with movement disorders such as stroke. I have attended this conference twice as a graduate student, and have found it immensely useful in both receiving feedback on my work, as well as learning about current research questions and innovations in the field of motor control.

As a researcher in the field of motor control, I believe this conference provides a unique opportunity to present my research to a small group of researchers who are highly specialized in this field. They will be able to provide feedback and insights that will be extremely valuable for publication of this work, and future experimentation. Some of the conference attendees are either editors or reviewers of major journals relevant to the field of motor control and learning. The format of this conference provides ample opportunities to meet scholars who I wish to collaborate with, and/or be mentored by.

Therefore, I believe that attending this conference will be most beneficial for my career as a postdoctoral researcher here at MSU.