Inter-trial Spacing Increases Retention in Motor Adaptation

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Over 2.5 million Americans suffer from motor disability due to strokes, accidents or neurological disorders. The rehabilitation process necessary for recuperation or management of such disabilities relies greatly on the ability to retain the training from session to session. A good understanding of the neural processes involved in this retention can serve to increase the effectiveness of these therapy sessions. We attempt to understand these underlying neural processes and try to elucidate the effect these mechanisms have on motor learning retention.

Previous research has shown that there are at least two different neural mechanisms that contribute to learning and retention. We can separate the relative contributions of these processes to overall learning and retention by increasing the time delay between each individual trial of a motor task such as a reaching movement. Consequently, we are able to selectively alter the contribution from one of the processes, which has been shown to be responsible for retention. By having different groups of subjects perform a learning task with different inter-trial times and by measuring their retention after 60 second and 24-hour delays, we show that the group with the longest spacing between trials has the best retention, whereas the group with the shortest spacing has the worst retention.

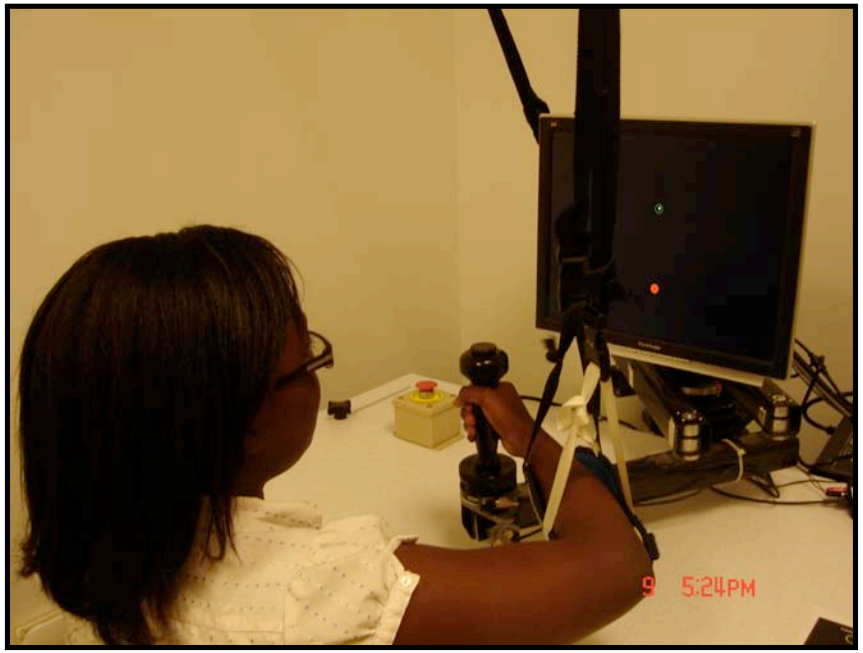

Figure 1. Harvard REU undergraduate student, Adenike Adewuyi, holds on to the robotic arm as she moves her hand to targets on a vertically-oriented computer monitor.

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