

**Name of Organizer:** George Wittenberg

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**Title of Symposium:** The Dynamics of Bimanual Coordination in Healthy Aging and Stroke

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**Description of submitted symposium (please limit to 2000 characters):** Motor function is a highly dynamic process, but thinking about motor function often uses static network models that do not capture the idea that regional connections can be both inhibitory and excitatory, depending on specific timing of the motor planning and execution process. Overall, cortical inhibitory drive seems to decrease with age, and the dynamics of pre-movement interhemispheric modulation are also reduced in comparison to younger people. Magnetically stimulated corticomotor evoked potentials (MEP) can be used to probe this process, measuring motor cortical effectiveness or excitability. Recent work that uses a bimanual wrist task has shown that older participants produce less torque when performing isolated isometric wrist extension, but are able to do so without excessive mirroring, and that interhemispheric inhibition at rest is reduced with age. New findings include a demonstration that motor maps may be less distinct (i.e. more spread) and dynamic range reduced with age. While still preliminary, these results seem consistent with previous studies that demonstrated decreased interhemispheric inhibitory drive with aging. This baseline disinhibition, however, does not necessarily alter the dynamics of that processes during movement preparation, executions and relaxation, but may alter the level of corticomotor recruitment at which those dynamics act. This has implications for the unimanual vs bimanual approach to recovery of motor function after stroke. A unilateral stroke affecting sensorimotor cortex or subcortical white matter results in contralateral weakness which has been a main focus of most rehabilitation outcome measures and interventions. We will present data from naturalistic as well as laboratory-based abstract bimanual tasks to demonstrate bimanual coordination differences between stroke survivors and age-matched controls. We will discuss how unimanual impairments and motor performance relate to impaired bimanual coordination.

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**Length of time required for symposium?:** 60 - 90 minutes

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**Additional Presenters (Limited to 4 additional presenters, list full name and email address) Please Note: Any Non-member speakers must receive prior approval from the Program Chair.:** Shailesh Kantak ([sskantak@gmail.com](mailto:sskantak@gmail.com)), Michael Dimyan ([MDimyan@umm.edu](mailto:MDimyan@umm.edu)), and an OT/PT researcher TBN.

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**What is the role of each presenter?:** Dr. Wittenberg will give an overview and moderate, Dr. Dimyan will talk about recent TMS studies related to healthy aging, and Dr. Kantak will talk about kinematic studies in stroke patient performing functional tasks. If a fourth speaker is included, they will discuss translational aspects (this could be Jill Whitall, Sandy McCombe Waller, or Dorian K. Rose).

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**Objective 1:** replace their idea of static network interaction with a dynamic model that explains some aspects of bimanual coordination.

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**Objective 2:** understand the concept of aging related spreading of activation in time and space.

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**Objective 3:** understand how unilateral stroke affects bimanual functional activities and how to design strategies to overcome deficits.