

Professor Carolee Winstein, PhD, PT  
University of Southern California



Presentation Title:

**Goal-Oriented Action:  
New Perspectives with Special Emphasis on  
Neurorehabilitation**

Abstract:

Futurists such as Ray Kurzweil describe exponential advances across myriad technological fields that are conspiring to usher in an era of profound change. This chapter traces recent progress in motor control through the lens of advances in our understanding of goal-oriented action with special emphasis on how these advances have shaped the questions we ask in our clinical research and the potential impact that research has had on the practice of neurorehabilitation. Given that goal-oriented actions take place in context, it is important to recognize that both the context of the individual (e.g. intent, confidence) and the environment (e.g. home, community) are important factors that influence and motivate the nature of the action. To better understand the discrepancy between capacity (i.e., what one can do) and performance (i.e., what one chooses to do) that is often observed in neurologically-injured populations (e.g. stroke, Parkinson's disease) whose lives take place outside the controlled clinical environments in which they are assessed, requires methods for capturing behavior and perceptions in real time in the natural environment. Ecological Momentary Assessment (EMA) paired with body worn sensors is one such method we have developed to

better understand the complex interplay between individual biopsychosocial factors such as confidence and the challenging contextual factors that present in the natural environment where life happens, and goal-oriented actions unfold. This chapter is divided into three sections. Common to each section is the promise that developing technologies and ecologically meaningful methods can be used to develop a roadmap toward personalization of neurorehabilitation. Each section illustrates the advances and challenges, with examples of studies from my lab group and others, most of which incorporate quantitative and qualitative methods into the research design.

#### Short CV:

Carolee J. Winstein, PhD, PT, FAPTA, is professor of Biokinesiology and Physical Therapy and directs the Motor Behavior and Neurorehabilitation Laboratory, University of Southern California, Los Angeles, CA, USA. She holds a joint appointment in the Department of Neurology, USC Keck School of Medicine. She is best known for work concerned with the functional neural and behavioral basis of motor control and learning and its relationship to neurorehabilitation. She has published extensively on scientifically derived neurorehabilitation approaches to enhance recovery and repair after adult onset stroke. Winstein's research program from its inception in the early 1990's until now has concentrated on the development of non-pharmacologic rehabilitation interventions motivated and informed by brain and behavioral science to enhance or even accelerate recovery in persons who have damage to the CNS. She has conceived and led small scale mechanistic-based research projects, medium size phase I and II clinical trials and large scale, phase III pragmatic trials, all in neurorehabilitation. She serves on the editorial board of the journal *Neurorehabilitation and Neural Repair* and served as president for the American Society of Neurorehabilitation from 2016-2018. Along with her research program, Winstein is committed to mentoring junior scientists in research and career development. Winstein believes that effective mentoring entails a collaboration consisting of structured training and education tailored specifically to the individual.

During her career, Winstein has had the honor of mentoring a fantastic group of predoctoral students, postdoctoral scholars, and junior faculty from diverse backgrounds in engineering, neuroscience, and rehabilitation medicine through both individual and institutional training mechanisms.