Keith Lohse, PdD

Post-Doctoral Research Fellow

School of Kinesiology

The University of British Columbia

February 7, 2013

**Title**: Video games and rehabilitation: Using design principles to enhance patient engagement.

**Abstract**:

**Background**: Hemiparesis following stroke or as the result of cerebral palsy is a severe impairment that affects millions of people. Recovery is limited and requires prolonged, intensive rehabilitation that is time consuming, expensive, and emotionally difficult. Thus, patient noncompliance with therapy is a major barrier to rehabilitation.

**Objectives**: In this review, we evaluate how video games, particularly those that can be interfaced with adapted control systems to allow patients to play commercially available videogames, can affect motor learning and motivation by increasing patient engagement with therapy. We take the novel approach of integrating research across robotics, game design, motor learning, neurophysiology, and rehabilitation medicine to provide criteria by which therapists can assist patients in choosing games appropriate for rehabilitation.

**Major Findings**: We show that video games are an effective method for improving cognitive and motor skill performance in both rehabilitation and experimental studies with healthy subjects. Physiological data suggest that gameplay can induce neuroplastic reorganization that leads to long-term retention and transfer. There is interdisciplinary evidence to show that key factors in game design, including choice, reward, and goals lead to increased motivation, engagement, and learning.

**Conclusions**: Videogame play is an effective supplement to traditional therapy that engages and motivates patients. Using rehabilitation relevant motions to control games, patients can functionally increase time in therapy through gameplay. Data suggest criteria by which therapists can evaluate games and suggest further research on adapted control systems that allow patients to play commercially available video games as a supplement to physical therapy.