The Neuroscience of Gaming

Presented at the Society for Neuroscience 2014 annual meeting in Washington, D.C. from November 15–19, 2014

Background:
Upwards of 1.2 billion people worldwide play games (online, via console, or mobile device), although many are unaware that programmers often incorporate neuroscience into game design. The use of neuropsychiatric concepts, such as operant conditioning and reinforcement schedules, has become increasingly present in electronic game design to encourage participation. The utilization of neuroscience concepts in electronic gaming can have both beneficial and negative effects. Several studies have demonstrated the broad utility of gaming for positive use in education, training, health, and rehabilitation (e.g., stroke and PTSD). Excessive gaming, on the other hand, may lead to addictive behaviors that have similar physiological effects to that of substance use disorders (e.g., mood modification, withdrawal, etc.). New policies to protect gamers from design features that may increase the likelihood of negative outcomes and encourage more positive applications from game designers may be warranted. Given the high prevalence of gaming in today's society, the Institute of Medicine Forum on Neuroscience and Nervous System Disorders, will organize a workshop during the Society for Neuroscience 2014 annual meeting, bringing together key stakeholders to explore the neuroscience of electronic gaming, with emphasis on relevant scientific, ethical, and societal issues.

Sunday, November 16, 2014

1:00p.m. **Session Overview**

JONATHAN MORENO
David and Lyn Silfen University Professor
Department of Medical Ethics and Health Policy
University of Pennsylvania Health System

1:10p.m. **An Inside Look on Gaming Design**

- Explore how games designers may incorporate structural features derived from neuroscience concepts into game design
- Discuss the latest research on the effect of electronic games on the brain and behavior

DANIEL GREENBERG
President
MediaRez

1:30p.m. **Advances in Education, Training, and Therapeutic Outcomes Using Games**

- Consider the physiological effects of gaming as a result of the game's structural characteristics
- Review the utility of electronic games in education, training, and rehabilitation

ADAM GAZZALEY
Associate Professor of Neurology, Physiology and Psychiatry
Director, Neuroscience Imaging Center
University of California, San Francisco – Mission Bay

1:50p.m. **When Gaming Goes Too Far: The Negative Implications of Problematic Gaming**

- Compare the effects of excessive gaming to other addictive behaviors (e.g., substance use disorders)
- Examine traits that may make a gamer at risk to excessive gaming

MARK GRIFFITHS
Professor of Gambling Studies
Director, International Gaming Research
Nottingham Trent University

2:10p.m. **Ethical and Social Implications for the Use of Neuroscience in Gaming**

- Discuss ethical and social implications for the continued use of neuroscience concepts in gaming design to the player
- Identify potential policies that may protect gamers from design features that may increase the likelihood of negative outcomes

MARTHA FARAH
Annenberg Professor of Natural Sciences
Director, Center for Cognitive Neuroscience & Society
University of Pennsylvania

1:30p.m. **Panel Discussion**

- What is the role and responsibility of game designers to educate players on the potential negative outcomes of gaming?
- How can technology advancements be leveraged to develop electronic games that encourage positive outcomes in players?

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3:00p.m. Adjourn