

2019 Klaus J. Jacobs Research Prize Recipient Prof. Daphne Bavelier, PhD

Daphne Bavelier (French, born 1966) is Professor, Rank Ordinaire at the University of Geneva, running the Cognitive Neuroscience Lab on Campus Biotech. Born and raised in France, she initially trained in Biology at the Ecole Normale Supérieure de Paris, and then received a PhD in Brain and Cognitive Sciences from Massachusetts Institute of Technology in Boston, USA. She then completed her training at the Salk Institute in San Diego under Helen Neville, a pioneer in human brain development. She joined the faculty at Georgetown University in the Neurology Department, before moving to the Brain and Cognitive Sciences Department at the University of Rochester in 1999. In 2011, she was named Professeure Ordinaire in the Faculty of Psychology and Education Sciences at the University of Geneva.

Scientific work

Bavelier's research explores how the brain adapts to changes in experience, either by nature (for example deafness) or by training (for example playing video games). She was the lead post-doctoral fellow on the first ever fMRI study addressing the plasticity of the language system as deaf children grow up using sign language. This work led the way to a heightened understanding in neuroscience about the adaptability of the human brain to changes in experience.

In the context of this work Bavelier's lab found in 1999 that playing fast-paced, action-packed entertainment video games, typically thought to be mind-numbing, enhances several aspects of cognition. She was able to prove that a group of study participants randomly assigned to playing action videogames improved in visual attention.

Over the last years Bavelier has worked on unpacking this rather surprising finding. Her main drive behind this research is to reveal the neural mechanisms by which one can unlock greater brain plasticity, and thus learning. She has identified enhanced attentional control as a key driver of the plastic changes induced by action video game play. While this result is in line with a growing scientific literature on the role of attention in learning, this work is notable because it is rare for a behavioral intervention to improve performance on tasks beyond the intervention itself. Yet, as Bavelier was able to show, action video game play does exactly that. It not only results in greater video game play expertise, but also in better performance on other tasks used to assess cognition.

Daphne Bavelier is a world leader in the study of brain plasticity and has brought its potential to the larger public by showing that action video games can modify attention, setting the stage for future learning. Her work has been characterized by a broad, interdisciplinary perspective and an associated fearlessness to tackle socially relevant themes with first-rate scientific rigor. Her research has profound implications for educators and policy makers, and she has had a substantial role in outreach of her findings to the more general public.

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Future plans and aspirations

With the prize money Bavelier will leverage her research on video games and brain plasticity to help consolidate a still fragmented field around the science of play. Her first aim is to characterize the brain states associated with play behavior, akin to what has been done for sleep. She conceives of play not just as an emotional brain state, as has been previously proposed, but as a unique exploratory motor mode associated with positive mood and high reward. Recent advances in brain imaging make it timely to reconsider this issue. The next aim will be to link these brain states to markers of future learning.

The prize money allows Bavelier to strengthen what is now largely a neuroscientific endeavor by bringing in experts with a clinical and educational background to help shape an integrated science of play.

Bavelier's work so far has concentrated primarily on possible positive impacts of action video game play; yet, this should not be taken to imply that there are no negative impacts or abusive use. Hence her future research will continue to parse out the differential impacts of action video games and their underlying neural mechanisms. Such an evidence-based approach is central to understanding how to maximize any possible positive outcomes, while minimizing or eliminating any negative outcomes.

Awards and honors

Bavelier has received various awards including the John Merck Scholar Award (2000-2004). Among other things, she was a finalist in the faculty category for the Blavatnik Awards for Young Scientist (2008); she was ranked among the top 50 French in the US by France-Amérique (2009); and she was selected as an APS Fellow by the Association for Psychological Sciences (2018).