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PRESENTER ABSTRACTS
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2013 Hay Award Team Presentation: Vision Science for Dynamic Architecture

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1. ABSTRACT

The relationship between the person and the built environment is dynamic. This dynamism unfolds over many spatial and temporal scales. Consider the varying viewing distances and angles of observation, and also the built environments that contain moving parts and moving pictures. The architect wants to predict human responses for the full range of these possibilities: a daunting task. We study how this challenge can be reduced using the systematic understanding of perception by sensory neuroscience.

Our starting point is the basic fact that human vision is selective. It is exceedingly sensitive to some forms of spatial and temporal information but is blind to others. A comprehensive map of this selectivity has been worked out in the tightly controlled laboratory studies of visual perception, where the subject responds to stimuli on a flat screen at a fixed viewing distance. We translate this map from the restricted laboratory conditions to the scale of large built environments.

Using a pair of industrial robots carrying a projector and a large screen, we created the conditions for probing the limits of visual perception on the scale relevant to architectural design. The large dynamic images propelled through space allowed us to trace boundaries of the solid regions in which different kinds of visual information could or could not be accessed. For this initial study, we concentrated on several paradoxical cases, such as the diminished ability to pick visual information as its source approaches the observer, and the abrupt change in visibility following only a slight change in the viewing distance.

In summary, we created a versatile measurement platform for mapping the spatial and temporal boundaries of perception in large spaces, for the forthcoming case studies in architectural and urban design, and for experiments in virtual architecture, mixed reality, and immersive cinema. Against the backdrop of a long and venerable history of "rationalization of space," from the early drawing systems to the invention of perspective and moving pictures, our study makes a case for the transition from research of representations of space to research of space that contains representations.

2. AUTHOR BIOS

Sergei Gepshtein, Ph.D. is a scientist at the Salk Institute for Biological Studies, trained in neurobiology, cognitive psychology, and vision science. Before joining the Salk Institute, Sergei investigated stereoscopic vision and the interaction of vision and touch at UC Berkeley. He studied the computational principles of perceptual organization (a modern incarnation of the inquiry originated in the Gestalt movement) at RIKEN Brain Science Institute in Japan. His current research concerns visual norms (whose role in perception is similar to the role of laws in physics) and the question of how vision is used for prospective control of action. Sergei is increasingly involved in developing new methods of perceptual continuity for immersive environments and cinema.

Alex McDowell is one of the most influential designers working in narrative media, with the impact of his ideas extending far beyond his background in cinema. With over 30 years of experience in narrative design, he advocates an immersive design process and the key role of world building in storytelling. Alex is teaching at the USC School of Cinematic Arts, Interactive Media Division and Production, with classes on world building and transmedia, and he was a Visiting Artist at MIT's Media Lab. He is a co-founder and the creative director of the 5D Institute - a global series of distributed events and an education space for an expanding community of storytellers in industry and academia - and the 5D Organization, which is devoted to building tangible worlds and immersive narratives.

Greg Lynn is an architect well-known for redefining the medium of design with digital technology and pioneering the fabrication of complex ergonomic forms using numerically controlled machinery. Because of his early combination of degrees in philosophy and architecture, Greg has been involved in combining

the realities of design and construction with the speculative, theoretical and experimental potentials of writing and teaching. He is a Studio Professor at the UCLA School of Architecture and Urban Design, where he is developing an experimental research robotics lab. He has been the Davenport Visiting Professor at Yale University for more than a decade.