

# empirical: embodiment in architecture & neuroscience

May 4<sup>th</sup>, 2016, 13.30 – Archizoom / 1015 Lausanne, EPFL Campus, SG 1211

Architectonic space engages several aspects of embodiment. While embodiment is a well-studied phenomenon in cognitive neuroscience, little is known about the impact of architecture on human behavior and self-consciousness. Here, we propose a symposium that promotes empirical scientific methods for architecture, studying the subjective experience of the body in space modulated by the facets of the environment.

Visuo-spatial effects of the arts on emotional states have been investigated for more than a decade through neuroaesthetics. Today knowledge about the effects of architecture on the body, feelings, emotions and wellbeing is sparse. We argue that findings from neuroscience can be implemented to the architectural design process for the improvement and enhancement of the user's experience of space. The symposium "empirical: embodiment in architecture & neuroscience" is dedicated to architects, neuroscientists and engineers, who are interested in initiating a community centered on space design. Architects and planners are facing today unprecedented challenges – and, in the same measure, there are scientific and technological advancements under development that have not been tested for architectural purposes yet.

## Guest talks

### *Theory, Culture, and Architectural Research* by Harry Mallgrave

Empirical or evidence-based research on architecture has been gaining momentum since the early 1960s. Yet the new tools of more sophisticated technologies of today—from brain-scanning devices to multisensory virtual realities—demand both new methodologies and a clarification of what precisely are we attempting to measure. It is clear that the postmodern direction of architectural thought of the recent past is outmoded, and thus we need a novel theoretical basis from which to approach these two issues. The major advances of the biological and cultural sciences in recent years provide a strong empirical basis, but it is also important to note that architecture is not a science but a free and poetic dialogue between designers and the dwellers for whom they design. A mediation has to be found, one that will focus on the user's experience with design.

### *The embodied image* by Juhani Pallasmaa

Vision is usually dealt with in isolation from the other senses, and visual perception is still commonly understood as a mode of projection. Yet, the complex and fragmentary process of vision is closer to a creative act than mechanistic projection, and in real life situations vision is always in interaction with the other senses. All the senses are ways of touching the world, and in concert with memory and imagination, they give rise to the sense of existence and the real. Sense experiences are internalized and embodied into the "polyphonic" and synthetic sense of self in the world. This embodied existential sense is the true ground of understanding the world as well as of the creative capacity. In order to have a deep emotive influence on us, the poetic image, in all art forms, has to be internalized into an embodied image.

## Program

13.00		<i>Door opening</i>
13.30 – 13.40	Isabella Pasqualini Tibor Joanelly	<i>Welcome</i>
13.40 – 14.10	<b>Olaf Blanke</b>	<i>Embodiment and bodily self-consciousness</i>
14.10 – 14.40	<b>Isabella Pasqualini</b>	<i>Visual touches, touching views</i>
14.40 – 15.30	<b>Harry Mallgrave</b>	<i>Theory, Culture, and Architectural Research</i>
15.30		<i>Coffee break</i>
16.00 – 16.30	<b>Andrea Serino</b>	<i>The body in space</i>
16.30 – 17.20	<b>Juhani Pallasmaa</b>	<i>The embodied image</i>
17.20 – 18.00	<b>Tibor Joanelly (chair)</b>	<i>General discussion</i>
18.00		<i>Apéro</i>

**Partners** Cyril Veillon, EPFL Archizoom  
Michele Petochi, EPFL Presidency

**Sponsor** the cogito foundation: [www.cogito.ch](http://www.cogito.ch)

**Prof. Olaf Blanke** is the director of the Laboratory of Cognitive Neuroscience and of the Center of Neuroprosthetics at the Swiss Federal Institute of Technology in Lausanne EPFL. Research at the LNCO bridges cognitive neurology, intracranial electrophysiology, experimental psychology, neuroimaging and engineering-based approaches to cognition and consciousness within a single research group. The LNCO made several seminal contributions towards a neuroscientific theory of self-consciousness and helped building the foundations for a new research field: the neuroscience of self-consciousness and its relation to cerebral processing of multisensory bodily signals. Over the last decade our research revealed some of the brain mechanisms of self-consciousness, i.e. brain structures that are crucial for human subjects to consciously experience the world from a body-centered or embodied first-person perspective. Architecture and art have been subsequently embedded into the research activities of the laboratory giving insight to embodiment and first and third person perspectives. Through the study of the Self in artistic self-portraits and other artworks in the past ten years the LNCO has gained some scientific insight about correlating neuroscientific and artistic processes.

**Isabella Pasqualini** graduated as an architect at the Swiss Federal Institute of Technology in Zürich (ETHZ) in 2000, after studies in Venice, Zürich and Madrid. She has worked for international architecture firms in Switzerland and abroad, before founding her own design practice in Switzerland. Isabella Pasqualini has won several international competition prizes and exhibited her work at Swiss as well as international art venues. Since 2012 she has a PhD in architecture and cognitive neuroscience from the Swiss Federal Institute of Technology in Lausanne (EPFL) and in 2012 she has been a visiting Professor at the Art & Design Academy of Tsinghua University in Beijing. In 2013 she has received the Fellowship grant of “the cogito foundation” and is currently a visiting scientist at the Laboratory of Cognitive Neuroscience (EPFL), as well as a lecturer at the School of Engineering and Architecture at EPFL. Isabella Pasqualini has published several papers about scientific empirical approaches to architectonic space and is a guest editor for *Frontiers in Cognitive Science*.

**Harry Francis Mallgrave** is an architect, scholar, editor, and professor of history and theory at the Illinois Institute of Technology. After several years in architectural practice, he took his doctoral studies at the University of Pennsylvania in 1983 under the supervision of Stanford Anderson. His dissertation topic – «The Idea of Style: Gottfried Semper in London» – presaged his focus on German theory in his early career. This phase of his work culminated in the intellectual biography «Gottfried Semper: Architect of the Nineteenth Century», which won the prestigious Alice Davis Hitchcock Award from the American Society of Architectural Historians. He has written numerous books and articles on the history and theory of architecture including: «Modern Architectural Theory: A Historical Survey, 1673-1968», and «An Introduction to Architectural Theory: 1968 to the Present». In recent years Mallgrave's interests have broadened, as indicated by his book «The Architect's Brain: Neuroscience, Creativity, and Architecture». He has more recently followed up on this study with «Architecture and Embodiment: The Implications of the New Sciences and Humanities for Design», published in 2013. It appeals to the emotional process of embodied simulation, rejects overly conceptualized approaches to theory and the objectification of design (viewing buildings as objects), and argues for a return to the focus of design to where it formerly resided – the human experience of inhabiting the world.

**Andrea Serino** is a Senior Scientist at the Center for Neuroprosthetics of the EPFL since 2012 and SNSF Professor at the University Hospital of Lausanne from 2017. He got his PhD in Neurophysiology at the University of Bologna, where he was also assistant professor from 2006 to 2012. He was also visiting scientist at University College London (2005), and invited professor at the University of Dijon (2010). His main research topic is, understanding the neurocognitive basis of body and self-experience in space. To this aim he has used multiple experimental techniques, both in healthy volunteers and in brain damaged or neuropsychiatric patients. He has published several papers in international peer-reviewed journals, such as *Neuron*, *Current Biology*, *Stroke*. His research has been funded by the Swiss National Science Foundation (CH), the Leenaards Foundation (CH), the Volkswagen Stiftung (Germany), the Bertarelli Foundation (CH), the Italian Ministry of Research, the Cariplo Foundation, the Emilia Romagna region (Italy) and the British Academy (UK). He received in 2006 the De Renzi Prize from the Italian society of Neuropsychology and in 2016 the Leenaards Prize for translational research.

**Juhani Pallasmaa** is a Finnish architect, former professor of architecture and dean at the Helsinki University of Technology. He has held the position of Director at the Museum of Finnish Architecture 1978-1983, and head of the Institute of Industrial Arts, Helsinki. He established his own architect's office – Arkkitehtitoimisto Juhani Pallasmaa KY – in 1983 in Helsinki. From 2001 to 2003, he was Raymond E. Maritz Visiting Professor of Architecture at Washington University in St. Louis, and in 2013 he received an honorary doctorate from that university. In 2010-2011, Pallasmaa served as Plym Distinguished Professor at the University of Illinois at Urbana-Champaign, and in 2012-2013 he was scholar in residence at Frank Lloyd Wright's Taliesin and a jury member for the 2014 Pritzker Architecture Prize. Juhani Pallasmaa is the architect of many buildings and the author of several books, among which figure «Understanding Architecture», «The Thinking Hand», «The Eyes of the Skin» and «The Architecture of Image».

**Tibor Joanelly** is an architect, publicist and teacher. He received his degree in architecture at the Federal Institute of Technology in Zurich (ETHZ) and worked in numerous well-known Swiss architectural offices. Next to his practice, he led atelier discourses with Swiss architects such as Christian Kerez, Valerio Olgiati and Livio Vacchini. He published essays and articles in architectural magazines. Tibor Joanelly was teaching at the Budapest University of Technology, at the ETHZ and at the University Liechtenstein. He currently lectures on «Architectural Debate» at the University for Applied Sciences in Winterthur and he is an editor of the Swiss architectural magazine *werk, bauen + wohnen*. He is engaged in several book projects as well as in architectural practice.

## Embodiment in architecture and neuroscience

The sensory experience of the volumetric interior has been attributed to the effects of the architectonic module on the observer (Semper 1860, Schmarsow 1893). The experience of standing in front of an architectonic structure or composition, on the other hand, has been linked to empathy or the transposition of feeling toward form (Vischer 1872, Wölfflin 1886). On these lines of theory, and by relating built space to the human body, modern architects have started considering architecture as the “art of creating space”, and, more in general, the “enclosing of space” (Berlage 1904), culminating in the 1950’s in Richard Neutra’s call for a shared culture between architecture and neuroscience (Neutra 1954). These aspects of architectonic space have been associated to perceptual concepts of embodiment in architecture, based for instance on perspective changes (Pasqualini and Blanke 2014), or embodied perception of meaning and processes (Freedberg and Gallese 2007). The sensory experience of architectonic space can therefore be related to distinct perceptual mechanisms: visual (or visuo-vestibular) and somatosensory (or sensorimotor) (Pasqualini et al. 2013). The human interaction with the environment has been studied by environmental psychologists and cognitive scientists considering mainly the functional aspects of space (Brunswik 1934, Brunswik 1937, Kirsh 1995), as well as its impact on the human body (Hall 1966). Today, the characteristics of these perceptual mechanisms remain speculative in question to data.

In cognitive neuroscience, embodiment refers to the processing of an external stimulus as referenced to one’s own body perception. It is based on multisensory integration and sensorimotor mechanisms (James 1890, Gibson 1979, Blanke 2012). Embodiment responses to architectonic stimuli evoke in the observer distinct multisensory sensations (i.e. touch, proximity, containment, drift etc.), which are linked to emotions and feelings, such as familiarity, safety and identification (Grüsser and Landis 1991). Several authors have recently highlighted the need of novel scientific approaches to study architecture (Eberhard 2007, Mallgrave 2009, Robinson 2012). At the level of perceptual processes it seems critical that such measures collect behavioral mechanisms, neural correlates, physiological measures and emotional states at the same time, since architectonic space evokes an experience that encompasses the full body and may not be completely captured by one singular phenomenon (Pallasmaa 1996, Pasqualini et al. 2013). The development of scientific methods to get hold of perceptual aspects of architectonic space is fundamental to the improvement of the building environment, and also to the advancement of technologies in the fields of architectural and urban design. How does architectonic space influence emotion and wellbeing through perceptual processes associated with the body? Empirical insights to this topic are missing and an alliance between neuroscience and architecture engages aesthetics of space based on cognition.

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