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The Operationalizing of Lynch's Cognitive Representation Elements of Large Scale Environments

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Throughout the millennia, starting with the work of Vitruvius "The Ten Books of Architecture", Andrea Palladio "The Four Books of Architecture", to the work of Kevin Lynch with his powerful wayfinding treatise "The Image of the City", architects have strived to codify the built environment. Architecture within the built environment is a powerful modifier of human behavior and physiology. Because of the very ubiquitous nature of architecture we find ourselves continually in spaces that we or someone else has designed. The study of the human organism in relationship to architecture is of critical importance.

The cross-discipline research of architecture and neuroscience has been around for some three hundred years. In the 17th Century, the English physician Thomas Willis became the father of neurology (Finger, 1994). Willis was part of the Oxford Circle, a cadre of intellectuals of various and diverse backgrounds studying physiology. They were also the first to introduce the idea of the word neurology to the medical lexicon. Of interest architecturally is Sir Christopher Wren, the designer of St. Paul's Cathedral of London, also a part of the group. Because he was an architect, his particular skills in draughtmanship (drawings) were used in sketching out various organs such as the brain. In 1664, Thomas Willis published one of the most important books in the history of brain sciences, his "Cerebral Anatomie" (Finger, 1994).

"Portraits of the Mind Visualizing the Brain from Antiquity to the 21st Century" by Carl Schoonover (2011), is a remarkable new text dealing with how one looks at the brain from Caja to fMRI, especially the new sophisticated technologies that have occurred in the last 10 to 15 years. Maister-Hoffman (p. 1-2, 2012) states, "Scientific advancements in cognitive science and brain imaging are impacting numerous disciplines and our overall understanding of how the brain learns and creates memories of the spaces we inhabit. Despite the fact that this research is in its infancy, it has already begun to reveal something about the cognitive nature of spatial learning and processing." Whitwam (para. 2, 2014) states, "Wherever you happen to be sitting or standing right now, you only know where that place is because of the place and grid cells in your brain. The discovery of these cells and the way they interact to help us understand the world just earned a group of scientists the 2014 Nobel Prize in Physiology or Medicine."

Cognitive neuroscience uses numerous methods, including behavioral tests and brain imaging techniques, to investigate the structure and organization of the brain that support different cognitive functions. Cognitive neuroscience can help explore how wayfinding via cognitive representations of large-scale environments is realized in the brain: what are the mental processes and cognitive functions that support wayfinding activities; and how are cognitive representations realized in terms of connectivity and interactions between neural circuits. With this in view, cognitive neuroscience research can offer insights to support the development of a theory of wayfinding, as well as an understanding of how the brain constructs cognitive representations of large-scale environments. Knox and Pinch (2009) state, "It is clear, though, that people do not have a single image or mental map that can be consulted or recalled at will. Rather, we appear to possess a series of latent images that are unconsciously operationalized in response to specific behavioral tasks. The seminal work in this field was Kevin Lynch's book "The Image of the City" published in 1960 and based on the results of ... From an examination of the resultant data, Lynch found that people apparently structure their mental image of the city in terms of five different kinds of elements: edges, pathways, landmarks, nodes and districts." The initial research would have a cross-discipline team including architects, urban planners, radiologists, neuroscientists, and can involve industry connections (CASA Strategic Plan Action 10). Action four in the CASA Strategic plan is to potentially establish Urban Planning in the School of Architecture (SOA). This grant and its proposed research areas would provide further evidence that Southern Illinois University has an interest in urban design; both urban and rural to sustain a discipline in this area.