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Architecture, Neuroscience Intersect

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New neurons are continuously being generated in the brains of adult mammals, and neuroscientists know that when they move an animal from an impoverished dull environment to one that is complex and stimulating, the number of those neurons increases dramatically. Being in a rich environment for even one month changes the ability of rodents to react to complex stimuli and increases their ability to learn new things.

With that in mind, neuroscientists and architects have started to work together to try to better understand what makes a human environment rich or beneficial and how such an environment might affect an individual's neurobiology. Already a formal association, the Academy of Neuroscience for Architecture (ANFA), has formed. In the second annual "Dialogues between Neuroscience and Society" lecture at SfN, world-renowned architect Frank Gehry described what he tries to accomplish with his buildings.

Architect Frank Gehry spoke at SfN about how his work progresses from ideas to finished buildings. For neuroscientists, those finished products present intriguing questions about how we interact with physical space and the role of the brain in that process.

Image courtesy of The Society for Neuroscience

One of the buildings he described is Maggie's Centre in Dundee, Scotland. It is a gathering place for cancer patients and their families, where they can obtain support services outside of a traditional medical environment.

It has a large, raised tower reminiscent of a lighthouse and has a big kitchen, Gehry said. The corrugation on the roof is inspired by a Vermeer painting of a woman in a white shawl that reminded Gehry of his friend for whom the center is named. "That is where I got the inspiration for them," he said.

But for Fred Gage, a neuroscientist at the Salk Institute and a member of the board of directors of the ANFA, the building raises a different question: What about a building supports or promotes the activities for which it is designed?

From a neuroscience perspective, the answer to that question remains unknown. As researchers take early steps forward, they are just starting to look at suggestive observations about how space alters the brain, beginning with rats. They are also trying to separate the role of visual interactions with an environment from the role of physical interactions.

One of the goals of the ANFA is to help train the next generation of architects to understand how different brain-related systems work, Gage said. Such appreciation will help them "understand the physiological processes and how a human interacts with the space, and what affect that may be having on the brain. … There are many architecture schools that are very interested in incorporating these things into their curricula."

A crucial question is how to conduct an experiment that would test the influence of environmental space on the function of the brain. The tools are being developed, Gage said. For example, by combining brain imaging techniques and virtual reality programs, scientists could watch what happens in an individual's brain as they "walk" through a space, then look to see how their brain activity changes as the space they encounter changes.