

Distinct Brain Regions Specialized For Faces And Bodies

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Are you tempted to trade in last year's digital camera for a newer model with even more megapixels? Researchers who make images of the human brain have the same obsession with increasing their pixel count, which increases the sharpness (or "spatial resolution") of their images.

Improvements in spatial resolution are happening as fast in brain imaging research as they are in digital camera technology. Nancy Kanwisher's lab in the McGovern Institute for Brain Research at MIT are now using their higher resolution scans to produce much more detailed images of the brain than were possible just a couple years ago. Just as "Hi-Def" TV shows clearer views of a football game, these finely grained images are providing new answers to some very old questions in brain research.

One such question hinges on whether the brain is comprised of highly specialized parts, each optimized to conduct a single, very specific function. Or is it instead a general-purpose device that handles many tasks but specializes in none? Using the higher resolution scans, the McGovern Institute research team of Rebecca Schwarzlose, Christopher Baker, and Nancy Kanwisher now provides some of the strongest evidence ever reported for extreme specialization. Their study appeared in the November 23rd issue of The Journal of Neuroscience.

The study focuses on face recognition, long considered an example of brain specialization. In the 1990s, researchers, including Kanwisher, identified a region known as the fusiform face area (FFA), located

towards the back of the brain and on the bottom surface, as a potential brain center for face recognition.

They pointed to evidence from brain imaging experiments, and to the fact that people with damage to this brain region cannot recognize faces, even those of their family and closest friends. However, more recent brain imaging experiments have challenged this claimed specialization by showing that this region also responds strongly when people see images of bodies and body parts, not just faces. The new McGovern Institute study now answers this challenge and supports the original specialization theory.

Schwarzlose and her colleagues suspected that the strong response of the face area to both faces and bodies might result from the blurring together of two distinct but neighboring brain regions that are too close together to distinguish at standard scanning resolutions. To test this idea, they increased the resolution of their images (like increasing the megapixels on a digital camera) ten-fold to get sharper images of brain function.

Indeed, at this higher resolution they could clearly distinguish two neighboring regions. One was primarily active when people saw faces (not bodies), and the other when people saw bodies (not faces).

This finding supports the original claim that the face area is in fact dedicated exclusively to face processing. The results further demonstrate a similar degree of specialization for the new "body region" next door.

The team's new discovery highlights the importance of improved spatial resolution in studying the structure of the human brain. Just as a higher megapixel digital camera can show greater detail, new brain imaging methods are revealing the finer-grained structure of the human brain. Schwarzlose and her colleagues plan to use the new scanning methods to

look for even finer levels of organization within the newly distinguished face and body areas.

They also want to figure out how and why the brain regions for faces and bodies land next to each other in the first place.

Rebecca Frye Schwarzlose is a graduate student and Chris Baker a post-doctoral researcher with Nancy Kanwisher, the Ellen Swallow Richards Professor of Cognitive Neuroscience in the McGovern Institute at MIT who was elected to the National Academy of Science in May 2005. The research was supported by the National Institutes of Health, the National Center for Research Resources, the Mind Institute, and the National Science Foundation's Graduate Research Fellowship Program.

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