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UI Research Shows Pigeons And People See Eye To Eye

Pigeons and people have more in common than you might think. They rely on similar visual cues to recognize objects, University of Iowa researchers discovered.

The research is significant because it could be used in developing intelligent robots and visual prosthetics.

The journal Current Biology published the findings today in an article titled "Nonaccidental Properties Underlie Shape Recognition in Mammalian and Nonmammamlian Vision." Two researchers in the College of Liberal Arts and Sciences Department of Psychology -- Ed Wasserman, Stuit Professor of Experimental Psychology, and Assistant Research Scientist Olga Lazareva -- co-authored the article with Brett Gibson from the University of New Hampshire, Frederic Gosselin from the University of Montreal in Canada and Philippe Schyns from the University of Glasgow in Scotland.

"What we're really interested in doing is trying to gain some understanding of object recognition and the basic perceptual and cognitive processes that are involved," Wasserman said. "Object recognition is something that has proven very difficult for computers to do, but it is quite easy for organisms to do."

The experiments were conducted in Wasserman's laboratory in 2003 and 2004 and funded by a National Institute of Mental Health grant.

Pigeons and people were trained to "name" a pictured object -- an arch, barrel, brick or wedge -- by selecting one of four response keys. Then, the researchers used a statistical method called "bubbles" to understand which features of each object were critical in setting it apart from the other objects.

"People see objects such as telephones from different distances, in various lighting conditions, and in different sizes and shapes, but we still recognize them as telephones," Wasserman said. "If other organisms were taught to recognize telephones, would they be looking at the same features? If they did, then it would be quite remarkable. They might look at one part of the phone or the entire pattern of the phone. The bubbles technique is quite wonderful in helping investigators identify just which features of objects are important for recognition."

Researchers discovered that both pigeons and people relied more on corners than on shading to recognize objects. That result was particularly interesting because a computer analysis indicated that corners were not the most distinguishing characteristics of the objects, Lazareva said.

Researchers used pigeons for the experiment because they have excellent vision and because they are not close evolutionary relatives of humans. The fact that people and pigeons are so different gave researchers a better opportunity to see how general the recognition processes might be. Despite the differences in each species, "the two biological systems that we compared were more alike than the computer we programmed to optimally discriminate the stimuli," Wasserman said. This means pigeons and people "do have some shared mechanisms of vision and cognition."

Wasserman earned a doctorate in psychology from Indiana University and has been with the UI since 1972. His research interests include the comparative analysis of learning, memory and cognition, with special interests in conceptualization, causation and visual perception. He has taught several graduate and undergraduate courses in experimental psychology and behavioral

and cognitive neuroscience.

Lazareva holds a doctorate in experimental psychology from Moscow State University in Russia. She came to the UI in 2001 as a postdoctoral research scholar. She studies relational learning and object recognition. Lazareva teaches Comparative Psychology, Psychology of Learning and Evaluating Psychological Research.

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