Neurons see what we tell them to see

September 26 2014

Neurons programmed to fire at specific faces—such as the famously reported "Jennifer Aniston neuron"—may be more in line with the conscious recognition of faces than the actual images seen. Subjects presented with a blended face, such as an amalgamation of Bill Clinton and George W. Bush, had significantly more firing of such face-specific neurons when they recognized the blended or morphed face as one person or the other. Results of the study led by Christof Koch at the Allen Institute for Brain Science, and carried out by neuroscientists Rodrigo Quian Quiroga at the University of Leicester, Alexander Kraskov at University College London and Florian Mormann at the University of Bonn, under the clinical supervision of the neurosurgeon Itzhak Fried at the University of California at Los Angeles Medical School, are published online today in the journal *Neuron*.

Some neurons in the region of the [brain](#) known as the medial temporal lobe are observed to be extremely selective in the stimuli to which they respond. A cell may only fire in response to different pictures of a particular person who is very familiar to the subject (such as loved one or a celebrity), the person's written or spoken name, or simply recalling the person from memory.

"These highly specific cells are an entry point to investigate how the brain makes meaning out of visual information," explains Christof Koch, Chief Scientific Officer at the Allen Institute for Brain Science and senior author on the paper. "We wanted to know how these cells responded not just to a simple image of a person's face, but to a more ambiguous image of that face averaged or morphed with another

person's face."

For the trials, subjects were shown either the face of individuals such as Bill Clinton or George W. Bush (the "adaptor" image), and then an ambiguous face which was a blend of both faces. Primed with the Clinton image, subjects tended to recognize Bush's face in the blended image, while subjects who saw Bush's face first recognized the blended face as Clinton. That is, even though the blended images were identical, subjects tended to consciously perceive the identity of face to which they were not adapted.

Researchers wanted to know whether these selective neurons responded to the actual image on the screen, or whether they responded more to the perception that the image caused in the brain of the subject. When subjects recognized the ambiguous face as belonging to Clinton, their Clinton-specific neurons fired. However, when subjects recognized that same face as Bush, the neurons fired significantly less. These results indicated that conscious recognition of the face played a crucial role in whether the neurons fired, rather than the raw visual stimulus.

"This study provides further evidence that stimulus-specific neurons in the medial temporal lobe follow the subjective perception of the person, as opposed to faithfully reporting the visual stimulus the person sees," explains Koch. "This distinction may help us glean insight into how the brain takes raw visual information and transforms it into something meaningful, which can be further modulated by other aspects of experience in the brain."

Provided by Edelman Public Relations