Whether we know it or not, we can 'see' through one eye at a time

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Although portions of the visible world come in through one eye only, the brain instantaneously takes all that information and creates a coherent image. As far as we know, we 'see' with both eyes at once. Now a new study suggests that the brain may know which eye is receiving information -- and can turn around and tell that eye to work even harder.

"We have demonstrated for the first time that you can pay attention through one eye, even when you have no idea where the image is coming from," says Peng Zhang, who conducted the study with University of Minnesota colleagues Yi Jiang and Sheng He. And the harder that eye is working -- the heavier the "informational load" -- the more effectively still that eye can attend to its object. The findings will appear in an upcoming issue of Psychological Science, a journal published by the Association for Psychological Science.

The researchers conducted two experiments, each with six observers ages 20 to 29, who viewed images through a mechanism that can separate stimuli by eye. In the first experiment, in one eye a target-which looked like a shiny compact disc -- gradually emerged in a sweeping fashion. In the other eye a "noise patch" of high-contrast flashing colored squares was displayed. Each image was in the same spot relative to its respective eye, so the two appeared in the same place in the field of vision; the target seemed to displace the patch as it came into view. A small round "cue," either in the target eye or the noise eye, also gradually turned from red to gray or back and got fat or thin. Participants had to press a button when it turned, say, red or fat and gray. At the same time,

they had to press as soon as they saw any part of the target appear.

The viewers took less time to notice the emerging target when it was in the same eye as the cue.

In the second experiment, the task was harder. Two cues were displayed at once and participants had to attend to both or to two "features" at once-indicating for instance when both were red or both red and thick. Like tougher training improving an athlete's performance, the additional "load" forced that eye to work harder-and, the researchers found, enhanced that eye's abilities further. Again, the target appeared even faster when the cues were in the target eye and even slower when they were in the noise eye.

The findings, says Zhang, suggest some intriguing things about the visual system. "Maybe there are binocular neurons in the brain" -- neurons that take in and collate information from both eyes -- "that also know which eye that information is coming from and can feed back to that eye," telling it to pay closer attention. In other words, the mechanisms of visual perception, and the communications between eye and brain, may be even more flexible and powerful than scientists thought.

Provided by Association for Psychological Science

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