Strobe eyewear training may improve visual abilities

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Strobe-like eyewear designed to train the vision of athletes may have positive effects in some cases, according to tests run by a team of Duke University psychologists who specialize in visual perception.

The eyewear has lenses that alternate between clear and opaque states, producing a strobe experience. Nearly 500 people participated in more than 1,200 training sessions and had their visual abilities tested before and after they wore the eyewear. They completed visual-motor tasks, such as catching and throwing a ball, as well as computer-based tests.

Once the eyewear is removed, the theory goes, the brain's visual processing has been trained to see the ball's path more clearly. The Duke psychologists found subjects experienced some improvements in noticing brief stimuli and detecting small changes in motion after training with the eyewear.

Anecdotally, some athletes who trained with the eyewear also report that the ball seems to have slowed down when they view it with regular vision afterwards, said Stephen Mitroff, an assistant professor of psychology and neuroscience at Duke who led the research.

The strobe eyewear has lenses that alternate between clear and opaque states at eight different rates, with a constant 100 milliseconds (one-tenth of a second) of clear vision between each opaque phase. At their most rapid flashing rate, the eyewear becomes opaque for 67 milliseconds, six times per second. At the slowest rate, they are opaque for 900

milliseconds, or 90 percent of each second.

Participants included Duke athletes in varsity football, men's basketball and men's and women's soccer, as well as students in club teams for ultimate Frisbee, volleyball and juggling, and other undergraduates.

Half of the participants trained with the strobe eyewear and the other half trained with control eyewear that was identical, but with clear lenses. All completed computer tasks that measured visual sensitivity and attention before and after training with the eyewear. The experiments were designed to evaluate whether those who wore the strobe eyewear would improve more after the training than those who wore the control eyewear, said postdoctoral researcher Gregory Appelbaum.

The research was funded by Nike, which developed the eyewear and is marketing it as Nike Vapor Strobe. The Duke team presented its findings May 6 in a poster session at the Vision Sciences Society in Naples, Fla.

Because this was a preliminary study, the researchers were unsure what measures would give them the clearest results. They tried several different lengths of exposure to the eyewear, different strobe rates and many physical and computer-based tasks. They found performance improvements in some tests, but not in all of them.

The Duke team measured slight improvements in some tests after only two 25-minute training sessions, and in both elite athletes and non-athletes. In other cases, they found no changes.

"Our results varied, but stroboscopic training does seem to enhance vision and attention," Mitroff said. "Not every test we tried showed differences, but several showed significant improvements."

For example, after training with the eyewear, participants were more sensitive to small amounts of motion. They also were better able to pick up visual details that were only available for about one-tenth of a second. Preliminary data also suggest a possible improvement at a dribbling skills test with the varsity soccer players.

The results show the eyewear does affect vision performance, but there is still much more to learn, said Mitroff, whose main body of research concerns the ability to see hidden objects in displays, such as security scans or radiological films. More research is needed to figure out how little or how much exposure to the eyewear has an effect, how long that effect may last and which skills are affected most.

"There are still many open questions," Mitroff said. "We don't know how long these effects last. We don't know much training is needed, and we don't yet have the whole picture on what is being trained."

Despite the lingering questions, Mitroff said the eyewear may be a great tool for looking at how the brain adapts to changing conditions and how visual cognition works.

Provided by Duke University