Paper examines the illusion of the scintillating grid

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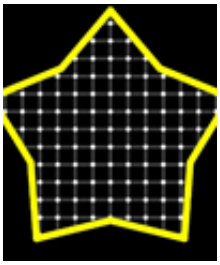

(Medical Xpress)—The fascinating but deeply weird illusion of the scintillating grid, where the grid appears to sparkle, has been shown to be more sparkly when you view it with both eyes rather than one eye.

Prompted into research after a question at a public talk, Dr Jenny Read and her team of young researchers at Newcastle University shed new light on how the brain is operating to create the illusion in a paper published today in the journal *i-Perception*.

When looking at the grid, which the researchers have fashioned into a star for the festive season, most of us see illusory flashing black disks within the physical white disks. Dr Read, a Royal Society Research Fellow in the Institute of Neuroscience explains: "Our work suggests that brain areas involved in 3D vision contribute to this sparkly effect."

The team of 6th former Andrew Lucas and Newcastle University undergraduate students Joseph Robson and Chris Smith, ran a series of experiments with the scintillating grid initially on a paper print-out and then on a 3D computer monitor. On the 3D monitor, images could be presented in one eye or both, without viewers noticing the difference.

Images from your two eyes are combined early in the brain, in the primary visual cortex, to give a single view of the world. This is known as binocular combination. If you close one eye and look at the grid, you are likely to see fewer sparkly black disks. This suggests that the illusory black disks are added before the images from the two eyes are combined in the brain. So, when you close one eye, its sparkles vanish.

However, using the 3D monitor the team were also able to test what happened when the dots were shifted sideways, away from the grid intersections. Like previous researchers, they found that this made the illusion much weaker when the disks were shifted in the same direction in both left and right eyes, but less weak when the disks were shifted in opposite directions in the two eyes. In other words, the illusion depends on the relationship between the two eyes' images – which is only known after binocular combination.

Dr Read explains: "There must be two separate mechanisms contributing to the sparkly sensation - one early in visual processing so in the retina or thalamus and before binocular combination, and one later, at or after the primary visual cortex.

"This is an example of what's called 'psychoanatomy' which is using people's perceptions to figure out where in their brain something is happening.

"What exactly is causing the scintillations remains a mystery, but because it occurs both before and after binocular combination it seems

that some pretty fundamental computation gets done at, at least, two levels of visual processing, and accidentally causes these scintillations as a side-effect."

The scintillating grid illusion was invented by Schrauf, Lingelbach and Wist in 1997 as a tweak on the classic 19th century illusion, the Hermann grid.

"Knowing how the brain normally combines images from the two eyes is important for when this process goes wrong, for example when someone has a squint," says Dr Read. "Vision tests like this, using 3D monitors, could help doctors measure the success of squint surgery."

Provided by Newcastle University