HIGHLIGHTS

VISUAL SYSTEM

Catch a shooting star

New work by Jancke and colleagues, using voltage-sensitive dyes to image neuronal activity *in vivo*, shows how activity in the early visual cortex can account for our perception of a classic visual illusion.

Visual illusions, in which we perceive something that differs from the physical stimulus, are often used to investigate perception. For example, in the line-motion illusion, a small square is flashed on a screen, immediately followed by a bar, one end of which is at the same point as the square. Rather than seeing a square followed by a stationary bar, subjects report that they see a bar being gradually drawn across the screen (rather like the tail of a shooting star; see http://www.nature.com/nature/journal/v428/n6981/extref/line-motion-examples.html for examples).

Psychophysical experiments have provided some evidence that this illusion involves the influence of higher cortical areas, but other studies point towards early processing stages. Jancke *et al.* used optical imaging of area 18 of the cat cortex (an early area in visual cortical processing) to investigate whether 'bottom-up' activity in the early visual cortex could lead to the illusory perception of movement.

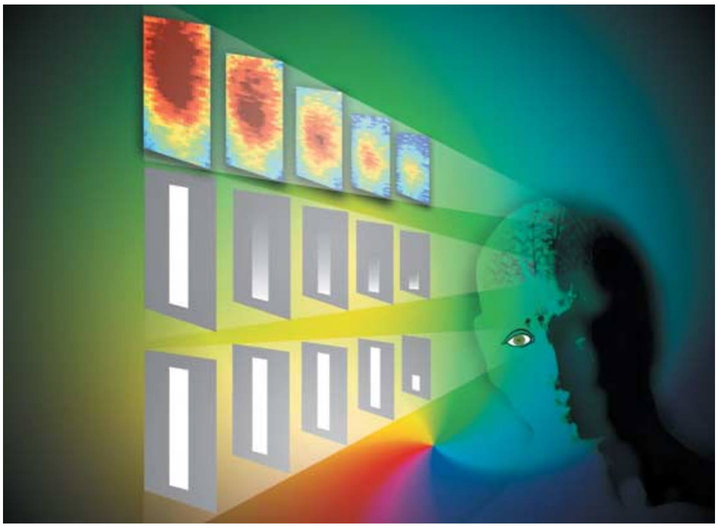
Although they found that either a flashed square or a flashed bar alone produced a stationary patch of spiking activity in the cortex, a square followed by a bar — as in the illusion — produced a different effect . Spiking activity began in the area of cortex corresponding to the position of the square, but when the bar was presented, the activity spread steadily along the cortex, from the position of the square to the other end of the bar (shown as a movie at http://www.nature.com/nature/journal/v428/n6981/extref/line-motion-examples_2.html). This activity pattern was identical to that produced by a visual stimulus in which the square moved at the same speed as the perceived movement in the illusion.

The initial spreading response to a bar presented after a square was faster than the response to a bar presented alone. When a square is presented alone, the area of spiking activity is surrounded by a spreading field of sub-threshold activity. This 'primes' the surrounding cortex so that any subsequent visual stimulus can produce a spiking response more quickly. Because the subthreshold activity is greatest near the area of spiking activity, and falls off with distance, the response to the stationary bar would be fastest in the cortex that immediately surrounds the area that responded to the square, and slower further away. This could explain the spreading activity and, the authors propose, the perception of motion — without the need for 'top-down' influences from higher areas of cortex.

Rachel Jones

References and links

ORIGINAL RESEARCH PAPER Jancke, D. *et al.* Imaging cortical correlates of illusion in early visual cortex. *Nature* **428**, 423–426 (2004)
FURTHER READING Eagleman, D. M. Visual illusions and neurobiology. *Nature Rev. Neurosci.* **2**, 920–926 (2001)



The bottom row of panels represents the visual stimulus. The middle row represents the subject's perception of the stimulus, and the top row shows recordings of activity from the cat visual cortex, showing how the activity (red) spreads across the cortex. Image courtesy of A. Grinvald, The Weizmann Institute of Science, Israel.