

Stare into Michelle Pfeiffer's eyes, and other faces will suffer by comparison, according to **Michael Morgan**

What would happen to your nervous system if you stared intently

into the eyes of Michelle Pfeiffer for two minutes? One of several possible answers can be inferred from a paper recently published in *Nature Neuroscience*. The eyes of Ms Pfeiffer, as you may have observed, are unusually far apart. On the continuum leading from rabbits to foxes, she is definitely the hunted rather than the hunter.

The authors of the *Nature Neuroscience* paper have discovered that staring at an unusual face for a while makes other faces seem distorted in the opposite direction. Staring at Ms Pfeiffer would probably cause you to see the eyes of ordinary faces as unusually close together, like those of tennis player Bjorn Borg.

People in the trade call this kind of distortion "sensory adaptation". We often stare for hours on end at images in an attempt to alter our brain, though seldom do we see such interesting images as that of Michelle Pfeiffer. In fact, most adaptation experiments are so mind-numbingly boring that the method could only have been invented by the Germans, according to William James.

A classical example of sensory adaptation is the waterfall effect. In 1834 the physicist R Addams visited the Fall of Foyers, near Loch Ness. In his own words:

"Having steadfastly looked for a few seconds at a particular part of the cascade, admiring the confluence and decussation of the currents forming the liquid drapery of waters, and then suddenly directed my eyes to the left, to observe the vertical face of the sombre age-worn rocks immediately contiguous to the waterfall, I saw the rocky surface as if in motion upwards".

The effect had previously been observed in the Austro-Hungarian Empire after inspecting columns of marching troops. With typical technical ingenuity, psychologists have managed to bring the waterfall effect into the laboratory and prove that it really exists. Over 1,000 scientific papers have been published on the phenomenon. Marlowe (the private eye, not the playwright) said that chess was the most elaborate waste of human effort to be found outside of an advertising agency. He was mistaken.

The waterfall effect is usually explained by fatigue



The eyes have it: perception depends on an electoral contest, such as in adapting to the distance between Michelle Pfeiffer's eyes

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in sensory nerve cells. We know that many nerve cells in the visual pathway respond vigorously to movement on the retina, and that each cell has its own preferred direction of motion. Since a particular moving object, and even a stationary one, stimulates all these cells to some extent, but some more than others, the perceived direction of movement must depend upon a delicate balance in the population of cells as a whole. In effect, perception is decided by a vote in which every cell has a voice. If one kind of cell is repeatedly stimulated by movement in its preferred direction, it becomes fatigued and its voice is diminished. When the movement stops, the overall vote goes in the opposite direction. The same is seen with colour. Adapting to a bright red swatch makes a yellow swatch look green. This is how we know that the perception of yellow depends upon a hung vote between the reds and the greens.

In the face adaptation experiment, people were

shown computer-processed images of faces which could be distorted to exaggerate features such as the distance between the eyes. They learned to distinguish between "Adam" and "Anti-Adam", who were distorted in opposite directions. They then adapted for several minutes to Adam. Finally, they were shown a face

Perception is decided by a vote in which every cell has a voice.

midway between Adam and Anti-Adam; adaptation to Adam made them more likely to classify the intermediate face as Anti-Adam. The logic of adaptation experiments leads us to infer that face perception depends on an electoral contest between cells specialised to detect certain facial features, like the distance between the eyes. After adaptation to Michelle

Pfeiffer, the eyes narrowly have it.

A final twist has been provided by Peter Thompson, a psychologist at the University of York, who asked people to estimate the distance between their own eyes, in centimetres or inches. You might like to try this yourself before reading what Thompson found. Think how your eyes look in the mirror. How far are they apart? Three inches? Most people over-estimate their interpupillary distance. Why they do so is as big a mystery as why the experiment was done in the first place. The *Comité Internationale des Mesures Inutiles* has defined the milli-Helen as the amount of pulchritude required to launch one ship. If the Pfeiffer be adapted as the unit of interocular distance, I calculate the average overestimation by people of their own interocular distance as about 50 milli-Pfeiffers.

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