

Editorial

Seeing oneself

Seeing one's own face needs a reflecting surface. I have discussed mirror images in previous editorials, and as I wrote a book on the subject (*Mirrors in Mind*, 1996) this might seem enough. But we have not looked closely at what happens in the unique case of seeing oneself in a looking-glass.

There are several quite puzzling mirror phenomena. The most discussed is the right–left but not up–down reversal in a looking-glass. There have been a score of theories, invoking physiology, psychology, geometry, linguistics, and more. The answer seems quite clear, however: objects must be rotated from direct view, to face the mirror behind them, and small objects such as books are usually (because of gravity) rotated around their vertical axis. On rotation around the horizontal axis, the mirror reversal is up–down and not right–left. This is easily confirmed with a book as the object, as reversal of letters is easily seen.

You are a special case, as you do not see yourself *not* rotated, from how others see you without the mirror.

Consider the driving mirror of a car. The number plates of the cars behind appear right–left reversed in the mirror. But what has rotated, to give this reversal? The point is: one's own head is rotated 180° from the cars behind, to see them in the mirror in front. The rotation may be of objects or of oneself to give 'mirror reversal'.

One's own face is a unique mirror-object as it is never seen directly, being invisible to its owner without a mirror. How, then, do you know that it is yourself in the mirror?

How does one recognise one's own face, though never seen except in a mirror? It may be that the related movements of the image to one's movements is the key to initial self-identification. Would young children recognise themselves initially in a still photograph? Would time-delayed video allow self-recognition? I doubt it. These would be interesting experiments.

Well known experiments by Gordon Gallup show that children below ten months of age do not recognise themselves in a mirror, and no animals except chimpanzees can do so (Gallup 1970). Gallup's experimental technique is to place a spot of rouge on one side of the face, and note whether the baby, or an animal, touches its own face or the mirror. Young babies, and animals except chimps, touch the mirror but not their face. Human adults, as well as chimps, touch the spot on the face. So they seem to know it is themselves in the mirror.

To see yourself in a wall mirror, you have to turn around to face it—normally rotating *vertically*, as your feet are on the ground. So you become right–left reversed, from how others see you face-on. But how does one see *oneself* 'mirror reversed'—reversed from what? For as one's own face is invisible without the mirror, there is no direct view for comparison. This makes one's own face a uniquely puzzling mirror-object.

You can't see your own face without a mirror because you can't take your eyes out and turn them around. The looking-glass allows you to see your face without taking your eyes out. But the mirror view is rotated 180° from direct view. For your eyes are aimed *outward* though they are seeing *inward*, from the mirror in front of you. Although you can't see your own face directly you can see your body without a mirror.

While standing up, one can bend one's head down to see the front of one's body. This is like taking one's eyes out and turning them around, to aim at oneself, but not so drastic.

There is something odd: while bent down, one's eyes are inverted; yet one does not appear upside down. If you look at an upside-down object, it looks upside down, whether your head is upright or inverted. So here is another asymmetry: inverting the head (and so the eyes) is perceptually different from inverting an object that is being viewed.

There must be an active perceptual compensation for keeping the world upright while the head is tilted or inverted, as the upside-down head (and eyes) does not give upside-down vision. Yet we believe that there is no process or mechanism present, or needed, to compensate the ever-present optical reversal—sideways and up—down—of retinal images. For the image is not an object that is seen. What matters for normal vision is spatial relations between seen objects as given by touch, and so on, to corresponding brain stimulation. The everyday reversal of the retinal images is unimportant, as the images are sources of information but not themselves seen. If they were, there would be an infinite regress of images—eyes—images—eyes ... This confused even Kepler.

How does the compensation for the inverted body, especially your upside-down head, work? What is the neural mechanism?

What would happen if one were inverted in the dark, preferably while asleep—then suddenly shown the world—with right-way-up and upside-down objects to look at? Would one be confused? Is there such confusion in space, in zero-*g*? This could be important, even life-threatening. If anyone knows the answers please write in.

But why do you look reversed to yourself in a looking-glass—as you can't step into the mind of others around you, and you do not see your own face except in the mirror? What is the *reference* for seeing that you are reversed from how others see you? Is it possible, that actually we *don't see* ourselves reversed? Without a reference, I rather think this is true.

Richard Gregory

References

- Gallup G G Jr, 1970 "Chimpanzee self-recognition" *Science* **167** 86–87
 Gregory R L, 1996 *Mirrors in Mind* (Oxford: Oxford University Press; 1998, London: Penguin)