Magazine section: **Features**

The grand illusion

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That stream of experience we call consciousness is not what it seems, says Susan Blackmore. No wonder it's proving so hard to explain

"THE last great mystery of science"; "the most baffling problem in the science of the mind"; this is how scientists talk about consciousness, but what if our conscious experience is all a grand illusion?

Like most people, I used to think of my conscious life as like a stream of experiences, passing through my mind, one after another. But now I'm starting to wonder, is consciousness really like this? Could this apparently innocent assumption be the reason we find consciousness so baffling?

Different strands of research on the senses over the past decade suggest that the brave cognitive scientists, psychologists and neuroscientists who dare to tackle the problem of consciousness are chasing after the wrong thing. If consciousness seems to be a continuous stream of rich and detailed sights, sounds, feelings and thoughts, then I suggest this is the illusion.

First we must be clear what is meant by the term "illusion". To say that consciousness is an illusion is not to say that it doesn't exist, but that it is not what it seems to be—more like a mirage or a visual illusion. And if consciousness is not what it seems, no wonder it's proving such a mystery.

For the proposal "It's all an illusion" even to be worth considering, the problem has to be serious. And it is. We can't even begin to explain consciousness. Take this magazine in front of your eyes. Right now, you are presumably having a conscious experience of seeing the paper, the words and the pictures. The way you see the page is unique to you, and no one else can know exactly what it is like for you. This is how consciousness is defined: it is your own subjective experience.

But how do you get from a real magazine composed of atoms and molecules to your experience of seeing it? Real, physical objects and private experiences are such completely different kinds of thing. How can one be related to the other? David Chalmers, of the University of Tucson, Arizona, calls it the "Hard Problem". How can the firing of brain cells produce subjective experience? It seems like magic; water into wine.

If you are not yet feeling perplexed (in which case I am not doing my job properly), consider another problem. It seems that most of what goes on in the brain is not conscious. For example, we can consciously hear a song on the car radio, while we are not necessarily conscious of all the things we do as we're driving. This leads us to make a fundamental distinction: contrasting conscious brain processes with unconscious ones. But no one can explain what the difference really is. Is there a special place in the brain where unconscious things are made conscious? Are some brain cells endowed with an extra magic something that makes what goes on in them subjective? That doesn't make sense. Yet most theories of consciousness assume that there must be such a difference, and then get stuck trying to explain or investigate it.

For example, in the currently popular "Global Workspace" theory, Bernard Baars of the Wright Institute in Berkeley, California, equates the contents of consciousness with the contents of working memory. But how does being "in" memory turn electrical impulses into personal experiences?

Another popular line of research is to search for the "neural correlates" of consciousness. Nobel Laureate Francis Crick wants to pin down the brain activity that corresponds to "the vivid picture of the world we see in front of our eyes". And Oxford pharmacologist, Susan Greenfield, is looking for "the particular physical state of the brain that always accompanies a subjective feeling" (*New Scientist*, 2 February, p 30).

These researchers are not alone in their search. But their attempts all founder on exactly the same mystery—how can some kinds of brain activity be "in" the conscious stream, while others are not? I can't see what this difference could possibly be.

Could the problem be so serious that we need to start again at the very beginning? Could it be that, after all, there is no stream of consciousness, no movie in the brain, no picture of the world we see in front of our eyes? Could all this be just a grand illusion?

You might want to protest. You may be absolutely sure that you do have such a stream of conscious experiences. But perhaps you have noticed this intriguing little oddity. Imagine you are reading this magazine when suddenly you realise that the clock is striking. You hadn't noticed it before but, now that you have, you know that the clock has struck four times already, and you can go on counting. What is happening here? Were the first three "dongs" really unconscious and have now been pulled out of memory and put in the stream of consciousness? If so, were the contents of the stream changed retrospectively to seem as though you heard them at the time? Or what? You might think up some other elaborations to make sense of it but they are unlikely to be either simple or convincing.

A similar problem is apparent with listening to speech. You need to hear several syllables before the meaning of a sentence becomes unambiguous. So what was in the stream of consciousness after one syllable? Did it switch from gobbledegook to words halfway through? It doesn't feel like that, it feels as though you heard a meaningful sentence as it went along. But that is impossible.

The running tap of time

Consciousness also does funny things with time. A good example is the "cutaneous rabbit". If a person's arm is tapped rapidly, say five times at the wrist, then twice near the elbow, and finally three times on the upper arm, they report not a series of separate taps coming in groups, but a continuous series moving upwards—as though a little creature were running up their arm. We might ask how taps 2 to 4 came to be experienced some way up the forearm when the next tap in the series had not happened yet. How did the brain know where the next tap was going to fall?

You might try to explain it by saying that the stream of consciousness lags a little behind, just in case more taps are coming. Or perhaps, when the elbow tap comes, the brain runs back in time and changes the contents of consciousness. If so, what was really in consciousness when the third tap happened? The problem arises only if we think that things must always be either "in" or "out" of consciousness. Perhaps, if this apparently natural distinction is causing so much trouble, we should abandon it.

Even deeper troubles threaten our sense of conscious vision. You might be utterly convinced that right now you're seeing a vivid and detailed picture of the world in front of your eyes, and no one can tell you otherwise. Consider, then, a few experiments.

The most challenging are studies of "change blindness" (*New Scientist*, 18 November 2000, p 28). Imagine you are asked to look at the left- hand picture in the illustration below. Then at the exact moment you move your eyes (which you do several times a second) the picture is swapped for the one on the right. Would you notice the difference? Most people assume that they would. But they'd be wrong. When our eyes are still we detect changes easily, but when a change happens during an eye movement or a blink we are change blind.

Another way to reveal change blindness is to present the two pictures one after the other repeatedly on a computer screen with flashes of grey in between (for an example see http:// nivea.psycho.univ-paris5.fr/ASSC *(Longer URL)*). It can take people many minutes to detect even a large object that changes colour, or one that disappears altogether, even if it's right in the middle of the picture.

What do these odd findings mean? At the very least they challenge the textbook description that vision is a process of building up representations in our heads of the world around us. The idea is that as we move our eyes about, we build up an ever better picture, and this picture is what we consciously see. But these experiments show that this way of thinking about vision has to be false. If we had such a picture in our heads we would surely notice that something had changed, yet we don't. We jump to the conclusion that we're seeing a continuous, detailed and rich picture. But this is an illusion.

Researchers differ in how far they think the illusion goes. Psychologists Daniel Simons of Harvard University and Daniel Levin of Kent State University, Ohio, suggest that during each visual fixation our brain builds a fleeting representation of the scene. It then extracts the gist and throws away all thedetails. This gives us the feeling of continuity and richness without too much overload.

Ronald Rensink of the University of British Columbia in Vancouver goes a little further and claims that we never form representations of the whole scene at all, not even during fixations. Instead we construct what he calls "virtual representations" of just the object we are paying attention to. Nothing else is represented in our heads, but we get the impression that everything is there because a new object can always be made "just in time" whenever we look.

Finally, our ordinary notions of seeing are more or less demolished by psychologists Kevin O'Regan of the CNRS, the French national research agency in Paris, and Alva Noë of the University of California, Santa Cruz, who first

described vision as a grand illusion. They argue that we don't need internal representations at all because the world is always there to be referred to. According to their "sensorimotor theory of vision", seeing is not about building pictures of the world in our heads, it's about what you are doing. Seeing is a way of interacting with the world, a kind of action. What remains between eye movements is not a picture of the world, but the information needed for further explor- ation. The theory is dramatically different from existing theories of perception.

It's not clear who's right. Perhaps all these theories are off the mark. But there's no doubt about the basic phenomenon and its main implication. Searching for the neural correlates of the detailed picture in our heads is doomed because there is no such picture.

This leaves another problem. If we have no picture, how can we act on the things we see? This question may seem reasonable but it hides another false assumption—that we have to see consciously in order to act. We need only think of the tennis player who returns a serve before consciously seeing it, to realise that this is false, but the situation is odder than this. We probably have several separate visual systems that do their jobs somewhat independently, rather than a single one that produces a unified visual world.

David Milner of the University of St Andrews, and Melvyn Goodale of the University of Western Ontario, argue that there is one system for fast visuomotor control and a slower system for perceiving objects. Much of their evidence comes from patients with brain damage, such as DF who has a condition known as visual form agnosia. She cannot recognise objects by sight, name simple line drawings, or recognise or copy letters, even though she produces letters correctly from dictation and can recognise objects by touch. She can also reach out and grasp everyday objects (objects that she cannot recognise) with remarkable accuracy. DF seems to have a visual system that guides her actions, but her perception system is damaged.

In a revealing experiment, DF was shown a slot set randomly at different angles (*Trends in Neurosciences*, vol 15 p 20, 1992). She could not consciously see the orientation of the slot, and could not draw it or adjust a line to the same angle. But when given a piece of card she could quickly and accurately line it up and post it straight through. Experiments with normal volunteers have shown similar kinds of dissociation, suggesting that we all have at least two separate vision systems.

Perhaps the most obvious conclusion is that the slow

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perceptual system is conscious and the fast action system is unconscious. But then the old mystery is back. We would have to explain the difference between conscious and unconscious systems. Is there a magic ingredient in one? Does neural information turn into subjective experiences just because it is processed more slowly?

Perhaps the solution is to admit that there is no stream of conscious experiences on which we act. Instead, at any time a whole lot of different things are going on in our brain at once. None of these things is either "in" or "out" of consciousness. But every so often something happens to create what seems to have been a unified conscious stream; an illusion of richness and continuity.

It sounds bizarre, but try to catch yourself *not* being conscious. More than 100 years ago, psychologist William James likened introspective analysis to "trying to turn up the gas quickly enough to see how the darkness looks". The modern equivalent is looking in the fridge to see whether the light is always on. However quickly you open the door, you can never catch it out. The same is true of consciousness. Whenever you ask yourself, "Am I conscious now?" you always are.

But perhaps there is only something there when you ask. Maybe each time you probe, a retrospective story is concocted about what was in the stream of consciousness a moment before, together with a "self" who was apparently experiencing it. Of course there was neither a conscious self nor a stream, but it now seems as though there was.

Perhaps a new story is concocted whenever you bother to look. When we ask ourselves about it, it would seem as though there's a stream of consciousness going on. When we don't bother to ask, or to look, it doesn't, but then we don't notice so it doesn't matter. Admitting that it's all an illusion does not solve the problem of consciousness but changes it completely. Instead of asking how neural impulses turn into conscious experiences, we must ask how the grand illusion gets constructed. This will prove no easy task, but unlike solving the Hard Problem it may at least be possible.

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