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VISIONS FROM THE DYING BRAIN

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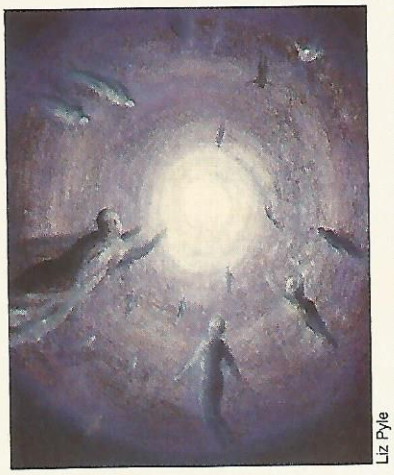
Visions from the dying brain

Near-death experiences may tell us more about consciousness and the brain than about what lies beyond the grave

Susan Blackmore

NEAR-DEATH experiences, reported by people who have been revived from apparent death, are deeply mysterious—or so we are led to believe. Many people think that they provide evidence for life after death or the inexplicability of our spiritual nature. Yet before we jump to such conclusions, we should see just how far physiological and psychological explanations can account for them, and how much near-death experiences, in turn, have to teach us about the brain.

After some 15 years of research, one thing is clear: when people come close to death and later recover they tend to describe a well-structured set of experiences. Here is a brief example sent to me by a woman from Cyprus.



Liz Pyle

> An emergency gastrectomy was performed. On the 4th day following that operation I went into shock and became unconscious for several hours... Although thought to be unconscious I remembered, for years afterwards, the entire, detailed conversation that passed between the surgeon and anaesthetist present..... I was lying above my own body, totally free of pain, and looking down at my own self with compassion for the agony I could see on the face; I was floating peacefully. Then... I was going elsewhere, floating towards a dark, but not frightening, curtain-like area.... then I felt total peace...
>
> Suddenly it all changed—I was slammed back into my body again, very much aware of the agony again.

In 1975 Raymond Moody, a psychiatrist from Georgia, first published his collection of near-death experiences (*Life after Life*, Covington, Georgia, Mockingbird). His account included experiences of floating along a dark tunnel, leaving the body and being able to watch the proceedings from a distance. People also reported meeting a "being of light" who helped them to review their past lives. Finally, they felt as if they were passing into another world where some final barrier marked the return from joy, love and peace to pain, fear or sickness.

Moody did nothing more than collect cases, and many people did not believe that his rather idealistic description would hold up to more thorough investigation. In fact it did. Kenneth Ring, of the University of Connecticut, interviewed 102 people who had come close to death through illness, accident or suicide attempts. Of these, almost half reported experiences which conformed in an obvious way to Moody's description (*Life after Death*, New York, Coward, McCann and Geoghegan 1980). Ring catergorised five stages of the near-death experience: peace, body separation, entering the darkness (or the tunnel), seeing the light, and entering the light. Not only did these five stages tend to unfold in order, but the first stage was more common (60 per cent of his sample reported peace) and the last least common (10 per cent).

This seemed to imply a kind of "ready-made" experience waiting to unfold its later, deeper stages the closer one came to death. More recently Bruce Greyson, a psychiatrist from the University of Michigan Medical Center, challenged this "invariance hypothesis" in the *American Journal of Psychiatry* (vol 142, p 967, 1985). He found that near-death experiences are not entirely invariant.

Such experiences also tend to take somewhat different forms in different cultures. For example, in India people more often meet up with some kind of messenger who consults a list of names and concludes that the wrong person has been called up—a reprieve is given. For Christians, the being of light is sometimes seen as Jesus, the angel Gabriel or even St Peter at his gates.

For anyone who finds it hard to imagine these experiences, I should emphasise how real they seem. The tunnel is so convincing that people often assume it is some "real" passageway to the next life. The out-of-body experience is so realistic that people are convinced that their spirit has left their body and can see and move without it. The positive emotions are so strong that many do not want to "come back". For those who reach the final stages, it often seems as though a conscious decision has been made to return to life and responsibilities rather than remain in bliss and peace. For many people, their life thereafter is quite different. They claim to be less materialistic and far more grateful for life and concerned with the welfare of others.

So how can we explain tunnels, out-of-body experiences and life transformations? In classic occult lore, the astral body is the vehicle for consciousness, separating from the physical body permanently at death, but also, temporarily, during life. So the out-of-body experience is really "astral projection". The tunnel is the transition between astral and etheric worlds; the blackness happens as consciousness is transferred from one to the other.

The problems with such an explanation are numerous. There is the question of what the astral is made of and how the astral and physical interact (indeed reflections of all mind-body problems). Then there is the problem of treating consciousness as some kind of "stuff" to be carried about by bodies. But the worst problem is that such theories provide very few testable predictions. The main one is that the astral body should be detectable, and many brave attempts have been made to detect it. From ingenious experiments early this century, which involved weighing people as they died, to modern parapsychological experiments, there has always been the hope that new apparatus would finally reveal the astral body. But of instruments increasing sensitivity have demonstrated only a reduction in the size of any claimed effect. I have argued that these theories have failed to make any progress (*Beyond the Body*, London, Heinemann 1982).

Nonetheless, such theories have great appeal because they seem, especially to the people who have had the experiences, to account for the phenomena. Dismissing near-death experiences as "just imagination" or "only an hallucination" is not a satisfactory explanation. If we are to provide better theories, we must not only criticise the occult ones effectively, but also produce alternatives that build on the rest of science, which make testable predictions and which also make sense to the people who have had near-death experiences. This is a tall order, but not impossible.

The astronomer Carl Sagan argued, and with much popular encouragement, that we can account for the universality of near-death experiences only by reference to the one experience we all share—birth. So the tunnel is "really" the birth

Mary Evans

Out-of-body experiences convince many people that an "astral body" leaves the corporeal body at death

canal and the tunnel experience and the out-of-body experience are a reliving of one's birth. Similar arguments have produced the big business of "rebirthing", regression and all sorts of other "New Age" techniques. The problems here are rather obvious. The birth canal is not at all like a tunnel, even if the fetus were actually looking face first and open-eyed into it. The cognitive capacities of the newborn are not such that it would remember the experience in a way which would make sense to an adult 20 or 50 years later. Studies of so-called "age-regression" under hypnosis show that subjects are generally inventing superficially plausible experiences. They greatly overestimate the capacities of young children.

The one redeeming feature of such a theory is that it is testable. If tunnels and out-of-body experiences are a rerun of birth, people born by Caesarean section should not have them. I gave a questionnaire to 254 people of whom 36 had been born by Caesarean. Both groups reported the same proportion of out-of-body and tunnel experiences. It could be that the experiences are based on the *idea* of birth *in general* but this drastically weakens the theory.

The weakest theory of all, though, must be the bald assertion that the experiences are "just hallucinations". Although it is often held up as "the scientific answer", it merely begs the questions: why those hallucinations? why a light at the end? why out-of-body experiences on the ceiling and not in the big toe? and why do they all seem so real? An effective approach must answer all these questions.

The tunnel seems to have a rather interesting origin in the structure of the visual system. It is not confined to near-death experiences but can occur in epilepsy or migraine; when falling asleep, meditating or just relaxing; with pressure on both eyes; or with certain drugs such as LSD, psilocybin or mescaline. In the 1930s, Heinrich Kluver at the University of Chicago noted it as one of the four constant forms of drug-induced hallucinations; the others were the grating or lattice, the spiral and the cobweb. Why do all these different conditions produce the same hallucinations?

The visual cortex of the brain, which processes both vision and visual imagination, is usually in a stable state; it is kept that way to a large extent by some neurons inhibiting others. Many of the conditions that produce hallucinations are those which reduce or interfere with inhibition. LSD, for example, suppresses the action of the Raphe cells, which regulate activity in the visual cortex. Any interference with inhibition may produce a highly excitable state.

Jack Cowan, a neurobiologist from the University of Chicago, argued six years ago, in in an analogy with fluid mechanics, that such an increase in cortical excitability would destabilise the uniform state and induce stripes of activity which propagate through visual cortex. So what kind of perception would these stripes produce? Visual space is first represented on the retina and then again in different areas of the brain's visual cortex. The centre of the visual field uses up far more neurons than the edges, and the whole "picture" is mapped from retina to brain by a complex mathematical function. Cowan shows that because of this mapping, the stripes of activity in cortex would appear as though there were concentric rings, tunnels or spirals in the world outside. Movement of the stripes would produce expansion of shrinking.

So it seems that the tunnel is a natural consequence of the way in which the visual cortex represents the visual world. And the light at the end? Because the number of neurons devoted to any unit area is much higher in the centre of the visual field, you would still expect a much greater effect in the centre if all neurons were equally affected by the release from inhibition. Presumably the more disturbed the system, the bigger the light ought to be, although no one has yet tested this idea.

Many questions remain, such as why one always seems to move forwards through the tunnel in near-death experiences, though not necessarily in other tunnel experiences. The most pressing question, however, is why, if it is an hallucination, it seems so real.

The answer to this may lie in asking what makes anything seem real. The distinction between "out there" and "in my mind" is not an easy one as far as the nervous system is concerned. Almost as soon as processing in vision or hearing starts, information from memory is mixed in with the sensory input. As the information passes through the multiple stages of processing, lines, edges, spaces and objects are represented in different ways. It seems unlikely that any simple tag could be attached which says "this came from outside" or "this is hallucination". I suggest instead that the decision is made at a much higher level. The system simply takes the most stable model of the world it has at any time and calls that "reality".

In normal life there is one "model of reality" that is overwhelmingly stable, coherent and complex. It is the one built up from sensory input. It is the model of "me, here, now". I am suggesting that this seems real only because it is the best model that the system has at the time.

But what about the dying system? What about a brain with massive disinhibition, beset with noise and in danger of failing altogether to produce a workable model of reality? It may well be that the stripes of activity in visual cortex are the most stable model the system has. So naturally it seems real. It is, after all, real in exactly the same sense as anything ever is real—because it is the best model at the time. And because the processing of images also takes place in the visual cortex, it ▶

Liz Pyle


EXIT

▶ makes sense that other images, and even whole other worlds, will be incorporated into the tunnel perspective.

No sensible system will give up entirely at this point. So what should it do? The obvious objective is to get back to a model driven by sensory input—a stable representation of the world out there—as soon as possible. One way of doing this would be to rely on memory: to ask, as it were, "Who am I? Where am I? What am I doing?" The answers will be there in memory, if enough capacity remains for processing. But we know something interesting about memory models. They are often in bird's-eye view.

So let us suppose that a dying woman's system constructs a model of what she knows should be happening; her body on the operating table, the surgeons around the bed, the lights above and the apparatus around. This may well be in a bird's-eye view, from the ceiling. It may be rather a good model. You need only think of the power of radio to invoke detailed visual images to realise just how good it could be. It may even incorporate some input, such as the sounds of people talking or the clink of instruments on the trolley, not to mention the jolts of attempts of resuscitation. In this way a mental model could be produced which is not only convincing but actually contains some correct details about the events going on at the time—and is in a bird's-eye view.

If this model is the best the system has at the time, it will seem perfectly real. Again it is "real" in exactly the same sense as anything ever is. This is, I suggest, how the out-of-body experience comes about.

From this approach come lots of testable predictions. For example, the people who have out-of-body experiences ought to be those who can more easily imagine scenes from a bird's-eye view, or more easily switch viewpoints in their imagination. I have confirmed this in several experiments (*Journal of Mental Imagery*, vol 11, p 53, 1987). They might also be those who recall things in bird's-eye view. Both myself and Harvey Irwin from the University of New South Wales, Australia, have found that people with out-of-body experiences tend to be those who recall dreams in a bird's-eye view, though not the events from waking life. The reason for this is not clear, but this approach already seems to be producing more progress than that based on the notion that something leaves the body.

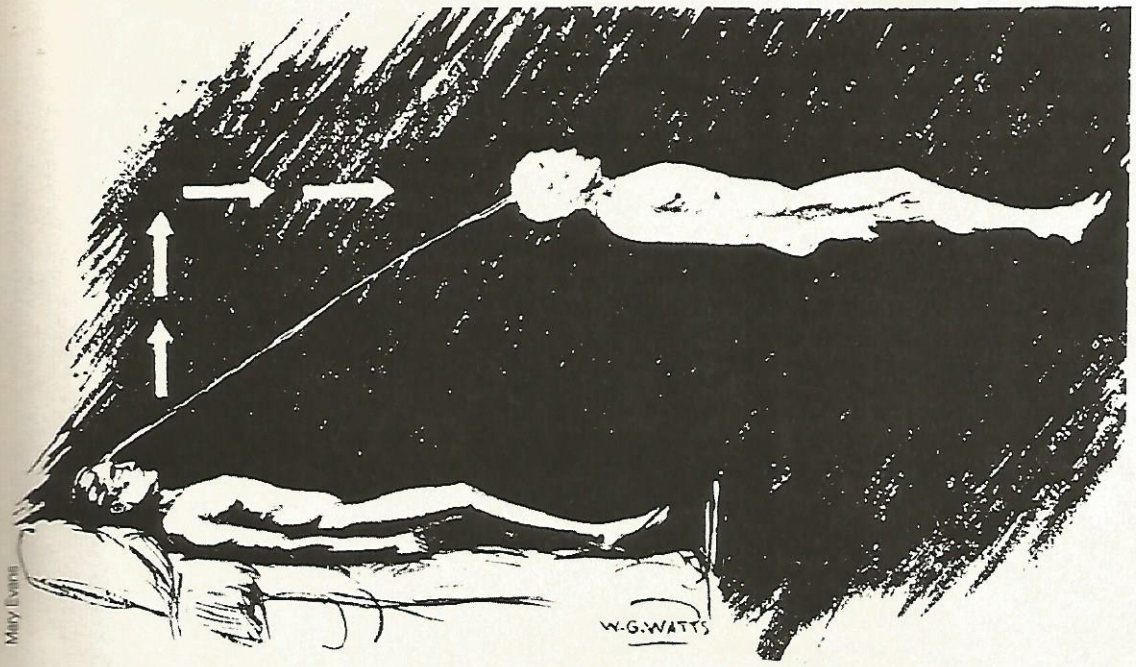
There is one small piece of evidence which presents a big challenge to the view I have presented here. Michael Sabom, a cardiologist from Atlanta, Georgia, has claimed that patients have seen things during near-death experiences that they could not possibly have reconstructed from hearing or from what they previously knew of resuscitation techniques (*Recollections of Death*, Corgi, 1982). Not only did he collect a few anecdotal tales, such as a shoe seen on an inaccessible window ledge, but he asked subjects to imagine going through a resuscitation procedure and to tell him what they "saw". What they saw was nothing like the detailed and correct descriptions of apparatus or the movement of needles on dials which people with near-death experiences saw from out of the body.

There are some problems with Sabom's work. A better control group would be made up of subjects who had actually been through the full procedure, and experienced the actions and conversations of staff. For this might all be heard during a near-death experience. The behaviour of the needles ought to be recorded precisely for comparison with the patient's account of the near-death experience. All this may be done in future research. Only then shall we know whether Sabom's data really challenge the view I have presented here and even whether they hold out hope to those looking for "something more" after death.

What, finally, of the reports of other worlds? Are they really the place where we shall meet again? Here we enter a much more tricky area with none of the predictability of the tunnel and the out-of-body experience. I think it is reasonable to suppose that the details of the other worlds depend upon one's expectation and prior experience but the same process makes them seem real and unforgettable. The possible worlds will depend on the constraints of a failing information processing system, and as we learn more about that system's functioning those constraints should become more obvious. In any case, it is an extraordinary experience to be thrown out of the normal limits of the sensory world and have to face up to the limits of one's own mental models.

This, then, is why the near-death experience has such a profound and lasting effect on the people who experience it. It is devastating to find that other worlds, tunnels of flying out of the body can seem real. If we take the view that consciousness depends upon the mental models being constructed at any one time, these people's consciousness has been transformed. Even when they come back to normal and the "real" world resumes its dominance, they cannot forget that for a time other worlds of imagination seemed real; that the body was trivial and for some there was even no self at all. It is a direct peek into the constructed nature of self and the world. They can never seem so solid or important again.

So the near-death experience may, after all, be transcendant and transforming, but not so very mysterious. It may tell us more about consciousness and the brain than about what may or may not happen after the grave. Its many components can be seen as changes in mental models brought about by disinhibition of the cortex and the breakdown of the normal model of reality driven by sensory input. But they should not be dismissed as "just hallucinations". They are life-transforming and important hallucinations and ones we would do well to try to understand. □



MARY EVANS

Years of ingenious experiments have failed to detect a departing spirit

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