

[The Lab Route to Out-of-Body Experiences](#)

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Some camera work, some stroking, and next thing you know you're out of your own body.
Photo courtesy Henrik Ehrsson

Sir Arthur Conan Doyle, best known as the creator of the coolly analytical detective Sherlock Holmes, was paradoxically a firm believer in the paranormal. His obsession with the supernatural fueled much of his (non-Sherlockian) fiction. In his short story "How It Happened," the protagonist wakes from a car crash. He is shocked by the experience but relieved to find his old friend Stanley standing beside him. The protagonist's view of the wreck is partially obstructed, and so he does not identify the inert body on the road. He then remembers that Stanley, whom he has not seen for years, died long ago.

'Stanley!' I cried, and the words seemed to choke my throat – 'Stanley, you are dead.'

He looked at me with the same old gentle, wistful smile.

'So are you,' he answered.

Similar accounts of out-of-body experiences -- in which a conscious person sees his or her own body from a location outside the physical body -- have been reported in clinical conditions that disturb brain function, such as near-death experiences, epileptic seizures, drug abuse, stroke, and certain psychiatric and neurological disorders. Last year, two research groups induced out-of-body experiences in healthy participants with virtual reality techniques. The experiments, described last August in studies by [H. Henrik Ehrsson](#) and [Olaf Blanke and colleagues](#) in *Science*, demonstrate that out-of-body experiences, previously confined to the realms of psychiatry, fiction and the occult, occur when the normal processing of sensory information is disrupted. This research provides an important tool to understand how the feeling of self is generated by the brain. Sherlock would approve.

Meet your virtual doppelganger

The experiments were conducted by research teams in the UK ([H. Henrik Ehrsson](#)) and Switzerland (Bigna Lenggenhager, Tej Tadi, Thomas Metzinger and [Olaf Blanke](#)). The participants wore virtual reality goggles connected to video cameras that filmed the participants' backs. Thus each participant saw his or her own body from the back.

But this trick alone did not induce an out-of-body experience. (And a good thing too. Otherwise you might have an out-of-body experience every time you check out your own backside in the fitting room at the mall). To complete the illusion, the scientists used two plastic rods to stroke synchronously, for 1 or 2 minutes at a time, the participant's back and the back of the virtual body. Next, the participants were asked to complete a questionnaire to evaluate their subjective perception of the illusion. Amazingly, they reported feeling as if they were being behind their physical bodies and looking at them from this location. The illusion failed when the stroking was asynchronous.

The results demonstrated that there are two key components to the feeling of being located inside the body. First, visual information from the first-person perspective provides indirect information about the location of one's body in space. The second factor is the detection of correlated tactile and visual events on the (illusory) body. Such multisensory correlations, together with the first-person visual perspective, determine the perceived location of one's whole body -- even if the correlated tactile and visual events are constrained to a small part of the body.

Don't walk towards the light!

Meanwhile, down in Switzerland, Lenggenhager and colleagues wondered if, following an out-of-body experience, participants might misjudge the location of their own bodies in space. To test this idea, they blindfolded the participants immediately after the stroking, then passively displaced them to a different position in the room. Then they asked them to walk back to their original location. Participants did not accurately return to their initial position, however. Instead they drifted significantly towards the previous position of the virtual body, suggesting that they had (at least partially) assigned the location of their selves to the virtual body. Such drift was not significant in the asynchronous stroking condition.

In a second experiment, the authors examined whether the illusion might depend on cognitive knowledge about bodies, and whether the drift towards the virtual body might be due to a general motor bias that happened to overshoot the initial position. To address these possibilities, they either presented the participants with their virtual own body (as in the previous experiment), a virtual fake body, or a virtual non-corporeal object (an elongated block) during synchronous or asynchronous stroking. Asynchronous conditions produced no illusion or drift. Synchronous stroking induced the subjective illusion for both the virtual own body and the virtual fake body, but not for the virtual object. That is, participants self-identified with both virtual bodies (their own and the fake), but not with the object. Moreover, the blind-folded participants showed significant drift towards both virtual bodies, but not towards the object. These combined results showed that the drift towards the virtual body was not due to a general motor bias but to the out-of-body illusion itself. Also, out-of-body experiences depend on the participants' knowledge about bodies: a non-corporeal object will not induce an out-of-body experience, whereas a bodily representation will, even if the body is not the participant's own.

I feel your pain

To provide further objective evidence for the illusion, Ehrsson "hurt" the virtual body by hitting it with a hammer and registered the electrical resistance of the skin of the (real) participants at the same time. The participants' skin conductance response (used by psychologists to measure emotional arousal) was significantly greater in the synchronous stroking condition (that is, in the presence of an out-of-body experience) than in the asynchronous condition (that is, in the absence of an out-of-body experience). Thus during an out-of-body experience, the participants responded emotionally to the threat of the hammer as if they were located behind their physical bodies.

A full-blown out-of-body experience?

Although the healthy participants reported seeing themselves from behind and misjudged the location of their bodies, they did not have the feelings of overt disembodiment that are typical of "full-blown" out-of-body experiences, such as those found in some patients with temporal-parietal damage. Lenggenhager and colleagues therefore proposed that other mechanisms in addition to the correlation of visual-tactile information (for instance, the correlation of visual-vestibular information) may be necessary to generate more complete transfer of the self to an illusory body. The authors speculate that the neural mechanisms underlying the spatial unity of self and body, as well as the disruption of such unity, may lie at the brain's temporal-parietal junction.

The experiments described here open a new research venue to discern the brain mechanisms generating our feeling of self. They also provide a scientific and rational explanation for supposedly paranormal experiences such as the out-of-body illusion, showing that this previously puzzling phenomenon can be replicated in the lab by simple experimental manipulations.

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Posted by [David Dobbs](#) SciAM Jan 22, 2008 9:26 PM EST

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7 Comments

Interesting study. Does the participant still see himself in a body, though displaced in space? If so, displaced position would be the more descriptive term. Does the participant when so displaced still feel bound by gravity? Calling this sensory trick "out of body" seems a publicist's term.

by [minorwork](#) Jan 23, 2008 11:18 AM

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Not interesting when one acknowledges that those who have actually had such experiences as Definitive Clairvoyance do not in fact see their bodies at all. Although, I supposed attempting to debunk the delusions of the actual event makes simpler grounds for funded research.

Australian aborigines have often described experiences where under severe physical distress they can 'leave their bodies' by transferring their consciousness to other living entities such as a swarm of midges hovering above them.

This allows their bodies to heal and survive in incredibly harsh environments.

Is this experience just a glitch in their temporal-parietal junction? Or could it be a succesful evolutionary adaptation of human consciousness?

by [sculptmud](#) Jan 24, 2008 2:41 AM
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Very remeniscent of Magritte's *La Reproduction Interdit*. Anyway, we really dig some of your stuff SciAm. We linked up to this one in

today's Hypertext Bazaar. Check us out, we're the [Memeticians](#).

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Edited by tical79 at 01/24/2008 9:22 AM

by [tical79](#) Jan 24, 2008 12:20 PM
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Interesting parlour trick. Try ingesting 1000 mg of mescaline, from the Peyote cactus, and see what happens. Aldous huxley found out. Read "The Doors of Perception". There is much to be learned from Lobsenz Rampa, & many others on the subject. Astral projection is real. The astral body is real. I have seen my own. If anything is an illusion, it is this "reality" and our mind-numbing faith in science.

by [Zephyrtom](#) Jan 25, 2008 4:56 PM
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Follow up to Zephyrtom.

A parlour trick it is, but still it helps us understand that Mr Rampa & co are at best hallucinating. And I think one should be sceptical about his work! Not only because his cat communicated his book to him...

All our nervous system communication relies on substances within us - also found in nature and drugs, for instance in mescaline. And when our brain functions alter or lose their normal controlled state because of altered substance amount, or just a plain malfunction in our brain, the "mind-numbing" science can explain this more and more easily. As with depression, chronic pain, schizophrenia, autism or astral projections. Read "The man who mistook his wife for a hat" by Oliver Sacks to get a glimpse of "the other side".

by [Nordiol](#) Jan 28, 2008 9:38 AM
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The Auto-immune Self or just the Self:

The virtual self object in the out of body experiment does exemplify a fact that nature conceals more than reveals. That one may never see his actual self, sees a virtual image, and mistakes it for himself ...nature makes a conceptual end to life impossible-it is always unknown. In the oldest greek literature Solon (I think) makes it clear to King Croesus that not only does he not think the king to be the happiest person he had ever encountered, but makes clear an argument that nothing earthly can be used to judge happiness as all things (wealth, luck, social success) are changeable, and the question of happiness cannot be answered by the living. Not only will one never actually be able to find himself anywhere, he has a capacity to think he is elsewhere- a falling (seeking) hammer would land elsewhere. ("Gee I'm sorry about the dent in your car but I wouldn't know, it just (excuse the pun) fell (happened) that way." or "how clumsy of me" -when I do know where my body is. That mankind is not pathetically a frail entity, whose life paths are not really guided by perceptions of where his feet are planted and which way they go -what decisions he makes, but by a mechanism that paradoxically both floats upon the air and is yet as failsafe, sturdy and dependable as one can depend on knowing the truth of up versus down from his perceptions or even whether all things either are or they aren't. A flimsy string wrapped haphazardly to anchor a million things can be more sturdy than rivetted steel. ...pathetically a frail entity also that he should not bomb others or experiment on himself as the only fact of the out of body experiment, that he cannot find his own real image, does not entail an assurance of existence-breath of life in order to seek.

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by [mkirsh](#) Feb 11, 2008 4:36 AM
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