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Heartbeat used to generate out-of-body experience

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Watching a video of your own body pulsing in time with your heartbeat can trigger an out-of-body experience. The illusion shows that our experience of existing inside our body depends on both external and internal sensations.

We take for granted our bodily

self-consciousness – the feeling of owning and being anchored in a body. But [out-of-body experiences](#) (OBEs) that

occur, say, during

epileptic seizures or even spontaneously in some people suggest that aspects of bodily self-consciousness can be disrupted.

OBEs have also been [induced in the lab](#) by feeding people conflicting sensory information, causing them to identify with a virtual body or a mannequin. In all these cases, researchers manipulated external, or exteroceptive, sensations such as vision and touch.

Could an out-of-body experience be induced by exploiting an internal or interoceptive signal, such as one's heartbeat? [Jane Aspell](#) and Lukas



Playing with visual feedback and linking it to your own heartbeat can shift your perception of where your body is
(Image: Volkan Kurt/Getty)

Heydrich, both then at the Swiss Federal Institute of Technology in Lausanne, along with [Olaf Blanke](#) and colleagues, decided to find out.

Virtual body with halo

They asked 17 people to stand wearing a head-mounted display that showed them a live video of themselves being filmed from behind, so that these volunteers were in effect seeing their own backs about 2 metres in front of them. The participants also saw a software-generated outline that surrounded the virtual body, like a halo.

The volunteers were also fitted with chest electrodes that recorded their heartbeat. This signal was used to make the halo flash, either in time with the heartbeat or slightly out of step. When the flashing was in sync with the signal, it was as if the subjects were watching their own heartbeat, though they were unaware of this. "Of course, it's not something you are exposed to in everyday life," says Heydrich. "You don't usually see your heart beating."

After six minutes of watching their own bodies on the display, with outlines flashing either in sync or out of sync with their own heartbeats, the volunteers closed their eyes and were gently guided backwards about 1.5 metres. Then they were asked to move towards where they felt they had been standing. In the in-sync trials, participants moved forwards closer to the location of their virtual body – suggesting the experience had altered their self-location. The out-of-sync trials did not alter self-location in any significant way.

What's more, the volunteers' answers to a questionnaire after each trial revealed that they identified more with their virtual body when the outline flashed in time with their heartbeat. One woman said she "wanted to disconnect from her own physical body".

This is the first time researchers have created a conflict between exteroceptive and interoceptive signals to induce such an illusion. "It shows that interoceptive signals are important for self-location and self-identification," says Heydrich.

Philosopher [Thomas Metzinger](#) of the Johannes Gutenberg University in Mainz, Germany, who studies the sense of self, is impressed by the experiment. "It tells us that human self-consciousness is anchored in interoception in a much stronger way than people have acknowledged before."

The study has been accepted for publication in the journal *Psychological Science*.

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