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ARE WE ALREADY LIVING IN VIRTUAL REALITY?

A new technology—virtual embodiment—challenges our understanding of who and what we are.

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Thomas Metzinger had his first out-of-body experience when he was nineteen. He was on a ten-week meditation retreat in the Westerwald, a mountainous area near his home, in Frankfurt. After a long day of yoga and meditation, he had a slice of cake and fell asleep. Then he awoke, feeling an itch on his back. He tried to scratch it, but couldn't—his arm seemed paralyzed. He tried to force the arm to move, and, somehow, this shifted him up and out of his body, so that he seemed to be floating above himself. Gazing out into the room, he was both amazed and afraid. He heard someone else breathing and, in a panic, looked around for an intruder. Only much later did he realize that the breathing had been his.

At the time, in the early nineteen-eighties, Metzinger was a philosophy student researching the mind-body problem at the Johann Wolfgang Goethe-Universität. During the postwar years, Theodor Adorno and Max Horkheimer had made the university's Institute for Social Research—the Frankfurt School—a center of neo-Marxist thought, and the campus remained a politically radical place. In Britain and America, philosophers, computer scientists, psychologists, and neuroscientists were working together to reconceive the mind as a purely physical system created by the brain. In Metzinger's department, such theories were denounced as anti-human and "proto-fascist." Metzinger considered himself a radical—he had waist-length hair, and was proud to have been teargassed while protesting the U.S. military—but also a rationalist. Immersing himself in the work of the Anglophone philosophers, he'd eventually become convinced that his soul was made by his brain. He was, therefore, doubly shocked by his out-of-body experience, which had seemed irrevocably real. Could materialism be wrong? Could consciousness exist immaterially, outside of the body? He admonished himself: "How arrogant I have been!"

Metzinger began reading about out-of-body experiences. He learned that between eight and fifteen per cent of the population reports having had an "O.B.E."—perhaps during the night, or after surgery—and that, for millennia, people have seen in such experiences evidence for various mystical theories of the soul. (Many religious

traditions hold that there is a "subtle body," or immaterial version of the self, capable of travelling through space.) Meanwhile, on occasional evenings, he floated around his room. One night, he tried to use the light switch (it didn't work); he decided to fly through the window and visit his girlfriend, but woke up instead. Metzinger began experimenting on himself. Following the advice of New Age "astral travellers," he stopped drinking liquids at noon, stared at a glass of water in his kitchen, and then slept with salt in his cheek, hoping to travel back to the glass at night. Before a minor surgery, he persuaded his anesthesiologist to alter his medication so that he could wake up early enough to experience the effects of the drug ketamine, which is famous for inducing out-of-body experiences. The salt had no effect, and the ketamine resulted in hours of unpleasant phantasmagoric hallucinations. Metzinger could find no way to produce O.B.E.s on demand, or to study them systematically.

In 1983, the psychologist Philip Johnson-Laird had published a book called "Mental Models," in which he argued that people often think not by applying logical rules but by manipulating models of the world in their minds. If you want to know whether a rug will go with your sofa, you don't deduce the answer—you imagine it, by moving furniture around on a mental stage set. During a heated dinner conversation in Tübingen, the psychologist Susan Blackmore, who had studied O.B.E.s, suggested to Metzinger that he hadn't actually floated around his room: "You were probably moving around your mental map, in your world model," she said. "No fucking way!" Metzinger remembers thinking. "These experiences are too realistic!" Later, he decided that Blackmore was right. Having read Johnson-Laird, he'd begun to wonder whether reality, as we experience it, might be a mental stage set—a representation of the world, rather than the world itself. Having an O.B.E. could be like visiting the set at night, when it wasn't being used. Metzinger started to think about how such a model might be constructed. Some internal mental system must function as an invisible, unconscious set dresser, making an itch feel like an itch, coloring the sky blue and the grass green.

As Metzinger developed these ideas, he also had fewer out-of-body experiences. Eventually, they ceased altogether; he set the subject aside and became an eminent philosopher of mind. Then, in 2003, he heard from a Swiss neuroscientist named Olaf Blanke, who had learned how to give people out-of-body experiences when they were fully awake. While treating a forty-three-year-old woman with epilepsy, Blanke had applied electrical current to a particular area of her brain, and she had the experience of

floating upward and looking down at her own body. Blanke had found many related illusions. Stimulating another location in the brain created the impression of a doppelgänger standing across the room; stimulating a third created the "sense of a presence"—the feeling that someone was hovering nearby, just out of sight. Unsure how to interpret these results, Blanke had searched the literature and come across some papers by Metzinger. They took the idea of mental models to its logical conclusion. It isn't just that we live inside a model of the external world, Metzinger wrote. We also live inside models of our own bodies, minds, and selves. These "self-models" don't always reflect reality, and they can be adjusted in illogical ways. They can, for example, portray a self that exists outside of the body—an O.B.E.

Metzinger and Blanke set about hacking the self-model. Along with the cognitive scientists Bigna Lenggenhager and Tej Tadi, they created a virtual-reality system designed to induce O.B.E.-like episodes. In 2005, Metzinger put on a virtual-reality head-mounted display—a headset containing a pair of screens, one for each eye, which together produce the illusion of a 3-D world. Inside, he saw his own body, facing away from him, standing in a room. (It was being filmed by a camera placed six feet behind him.) He watched as Lenggenhager stroked its back. Metzinger could feel the stroking, but the body to which it was happening seemed to be situated in front of him. He felt a strange sensation, as though he were drifting in space, or being stretched between the two bodies. He wanted to jump entirely into the body before him, but couldn't. He seemed marooned outside of himself. It wasn't quite an out-of-body experience, but it was proof that, using computer technology, the self-model could easily be manipulated. A new area of research had been created: virtual embodiment.

From 2010 through 2015, the virtual-reality researchers Mel Slater and Mavi Sanchez-Vives worked with Metzinger and Blanke, in a fourteen-partner E.U.-funded project called Virtual Embodiment and Robotic Re-Embodiment. Their labs, in Barcelona, used immersive virtual reality to manipulate the body models of research subjects, convincing them that the bodies they possessed in V.R. were their own. (Slater and Sanchez-Vives are married; they met at a V.R. workshop, in 2001.) "We have the illusion that our body model is very stable, but that's only because we've never encountered anything else," Sanchez-Vives said. People who are extremely aware of their bodies—dancers, athletes, yogis—can find the adoption of a virtual body difficult, because they have trouble "letting go." "But the more you do it the easier it becomes.

After you've experienced it once, twice, you click into it." In the past few years, Slater, Sanchez-Vives, and other virtual-embodiment researchers have discovered therapeutic and educational uses for the technology. Meanwhile, Metzinger, along with the philosopher Michael Madary, has drafted a virtual-reality "code of ethics" focussed on embodiment, which he believes makes V.R. fundamentally different from all other media. Embodied virtual experience, the philosophers write, can change us profoundly. It can affect us in ways we barely understand, redefining "the very relationship we have to our own minds."

As soon as virtual reality became workable, in the early nineteen-eighties, researchers imagined creating vivid, detailed, hallucinogenic worlds. In the memoir "Dawn of the New Everything," the V.R. pioneer Jaron Lanier recalls evangelizing the technology by describing a virtual two-hundred-foot-tall amethyst octopus with an opening in its head; inside would be a furry cave with a bed that hugs you while you sleep. ("Virtual reality tugs at the soul because it answers the cries of childhood," Lanier writes.) Later, the "Matrix" movies imagined a virtual world so accurate as to be indistinguishable from real life. Today's most advanced V.R. video games conjure visually rich space stations (Lone Echo), deserts (Arizona Sunshine), and rock faces (The Climb). The goal is to convince you that you are somewhere else.

Virtual embodiment has a different goal: convincing you that you are someone else. This doesn't require fancy graphics. Instead, it calls for tracking hardware—which allows your virtual body to accurately mirror the movements of your real head, feet, and hands—and a few minutes of guided, Tai Chi-like movement before a virtual mirror. In Slater's lab, at the Universitat de Barcelona, I put on a V.R. headset and looked into such a mirror to see the body of a young woman wearing jeans, a T-shirt, and ballet flats. When I moved, she moved.

"You're going to see a number of floating spheres, and you have to touch them," Guillermo Iruretagoyena, a software developer, said.

A few colorful balls appeared near my hands and feet, and I moved my limbs to touch them. The spheres disappeared, and new ones took their place. After I touched the new spheres, Iruretagoyena explained that the "embodiment phase" was complete—I had tricked my brain into thinking that the virtual limbs were mine. My virtual self didn't feel particularly real. The quality of the virtual world was on a par with a nineteen-nineties video game, and when I leaned into the mirror to make eye contact with myself my face was planar and cartoonish. Like a vampire's, my body cast no shadow.

To my right, I heard the sound of keys in a door. I turned and saw a hallway. At the end of it, a man entered, with dark hair and a beige sweater.

"You fat cow," he said, in a low voice. "Would it hurt to put on something nice?"

He began walking toward me. I looked at myself in the mirror. "Look at me!" he shouted. He walked up to a dresser, saw my cell phone, and threw it against the wall.

I watched, merely interested. It was obvious that he was a virtual person; I was no more intimidated by him than I would be by an image on a screen. Then he got closer, and closer still, invading my personal space. In real life, I'm tall, but I found myself craning my neck to look up at him. As he loomed over me, gazing into my eyes, I leaned away and held my breath. I could sense my heart racing, my chest tightening, and sweat breaking out on my temples. I felt physically threatened, as though my actual body were in danger. "This isn't real," I told myself. Still, I felt afraid.

Since 2011, the regional government of Catalonia has collaborated with the lab to use this simulation in rehabilitation programs for abusive men. In a controlled study performed in Sanchez-Vives's lab by the psychologist Sofia Seinfeld, and recently published in *Nature's Scientific Reports*, the men who experienced the simulation got significantly better at recognizing fear in the faces of women. (Domestic abusers tend to be deficient in this regard.) In the past three years, hundreds more abusive men have experienced the simulation outside the lab, as part of a larger rehabilitation program. Preliminary data, which Sanchez-Vives and Slater are hesitant to publish because of the small sample size, suggest that the men's recidivism rates are lower. ("I felt identified with my ex-wife," one man recalled. "I thought he was going to hit me, so I covered my face with one of my hands," another said.) Men who have merely watched a video, or experienced a V.R. simulation without undergoing the embodiment process, report fewer such epiphanies.

Slater, a slight, soft-spoken Englishman in his sixties with a youthful, amazed demeanor—he could be an especially placid incarnation of the Doctor, in "Doctor Who"—walked me to the campus coffee bar. At a table by the window, he tried to explain how virtual embodiment might effect such changes. "No one really understands what this technology is and how it can be used," he said. "On some level, the brain doesn't know the difference between real reality and virtual reality. And a character on a

2-D screen is completely different from one that's your height and looks you in the eye."

With a team of various collaborators, Slater and Sanchez-Vives have created many other-body simulations; they show how inhabiting a new virtual body can produce meaningful psychological shifts. In one study, participants are re-embodied as a little girl. Surrounded by a stuffed bear, a rocking horse, and other toys, they watch as their mother sternly demands a cleaner room. Afterward, on psychological tests, they associate themselves with more childlike characteristics. (When I tried it, under the supervision of the V.R. researcher Domna Banakou, I was astonished by my small size, and by the intimidating, Olympian height from which the mother addressed me.) In another, white participants spend around ten minutes in the body of a virtual black person, learning Tai Chi. Afterward, their scores on a test designed to reveal unconscious racial bias shift significantly. "These effects happen fast, and seem to last," Slater said. A week later, the white participants still had less racist attitudes. (The racial-bias results have been replicated several times in Barcelona, and also by a second team, in London.) Embodied simulations seem to slip beneath the cognitive threshold, affecting the associative, unconscious parts of the mind. "It's directly experiential," Slater said. "It's not 'I know.' It's 'I am.' "

Slater envisages salubrious, even beatific ways of learning through virtual embodiment. "Imagine if you're afraid of public speaking. Now you can experience being embodied as Angelina Jolie and giving a speech in front of thousands of cheering people," he said. (The confidence you feel while embodied as Jolie would, he thinks, follow you back into your own body.) In 2015, for an art exhibit at the Centre de Cultura Contemporània de Barcelona, Slater's team built a virtual reality in which participants lived together on a psychedelic tropical island, embodied as elegant humanoids reminiscent of the blue Na'vi, from "Avatar." In the course of an hour and a half, their virtual bodies grew old and died; after death, the participants reviewed their virtual lives in a flashback, then floated upward into a tunnel of white light. When they took off their headsets, they watched, on a screen, as their island compatriots built a memorial to them. People who have near-death experiences emerge with new ideas about the meaning of life; Slater's lab is studying whether virtual death might have a similar effect. "We were trying to play with the implicit idea that there could be

immortality, and that this life is a virtual life—as though, after we die, we take off our headsets and are on another plane," he said.

Virtual embodiment isn't always uplifting. In 2015, the video-game company Capcom released Kitchen, a virtual-reality horror scenario in which the player is tied to a chair while a deranged woman plunges a knife into his thigh. In the V.R. game Surgeon Simulator, players use power drills, bone saws, and other tools to vivisect a humanoid alien that writhes in pain on the operating table. As in most V.R. video games, players in Kitchen and Surgeon Simulator move in fanciful ways and are, at best, semi-embodied. Even so, in the book "Experience on Demand," Jeremy Bailenson, a leading V.R.-embodiment researcher at Stanford, reports that after performing a virtual vivisection he "simply felt bad. Responsible. I had used my hands to do violence." Pushing a Punch or Shoot button on a game controller and watching the results on a screen, he writes, is "an entirely different experience" from playing an immersive, first-person V.R. game in which you use your virtual arms and hands to strike or stab an opponent, or to aim a gun at him and pull the trigger. In their V.R. code of ethics, Metzinger and Madary predict that the "risk of users suffering psychological trauma will steadily increase as V.R. technology advances." Metzinger believes that virtual killing and sexual violence should be prohibited. He also worries about scenarios that encourage the character traits that psychologists refer to as "the dark triad": narcissism, Machiavellianism, and psychopathy. He fears the effects of a V.R. "Westworld."

"It's inevitable what's going to happen," Slater said, over coffee. "There's going to be a moral panic around V.R. as it spreads and spreads, just as there was with comics, with television. It's going to be the root of every evil, and there's going to be a huge campaign against it. I hope the companies realize this, because they have to be prepared for it." Slater, who led the Virtual Embodiment and Robotic Re-Embodiment project and, with the other researchers, worked with Metzinger on the V.R. code of ethics, thinks some caution is justified: "Virtual reality is going to be quite widespread, and in the home. And although it's been around in more or less the form it is now for thirty, forty years, with head-mounted displays, and so forth, there's nobody who's spent hours and hours, week after week, month after month, in virtual reality. Nobody knows what's going to happen."

After our coffee, Slater walked me back to the lab. It was an unusually cold day, and the campus was hushed and empty. Jaron Lanier writes in his memoir that the best part of V.R. comes after you remove the headset: having been immersed in a comparatively flat computer-generated world, one finds that, in real life, "the most ordinary surface, cheap wood or plain dirt, is bejeweled in infinite detail for a short while." As we walked, I was spellbound by pine needles and by the texture of concrete. I marvelled at the Escher-like dimensionality of a stairway, and at the snowflakes that had begun to drift among the palm trees.

Inside, I followed Slater up a flight of stairs. On the landing, we passed a tall humanoid robot with expressive eyes; its metal skeleton was visible beneath white plastic skin. In a nearby lab, Laura Aymerich, a psychologist, and Sameer Kishore, a roboticist, helped me into a skintight Velcro suit covered in white plastic dots. I put on headphones and a V.R. headset. The headphones were silent, and the headset was dark. For a few minutes, I stood there, alone with my thoughts.

"Sorry," Kishore said. "Technical difficulties."

Then the headset activated, and I appeared to be on the landing, by the stairs outside the lab. I was looking through the eyes and hearing through the ears of the robot. Kishore wheeled a small standing mirror into position so that I could see myself. To my surprise, my face—the robot's face—was now lit from within and glowing blue.

The robot's movements tracked mine; I moved my robotic arms up and down, and my head from side to side. When I looked to my left, I saw Slater, standing by the stairs; when I looked to my right, I could see through a window to the courtyard, where snowflakes floated. There was a slight lag between my head movements and the robot's, and when I perceived it I felt half-embodied, as if I'd had too much to drink.

"The visual aspect of it is strong, but the sensorimotor aspect of it is conflicting," Kishore said. "If you're trying to move your head and it doesn't move, that leads to a break in the feeling of embodiment." I was only half paying attention; I was transfixed by the robot's metal hands, which seemed to move when I willed them to. With both my heads, I nodded.

Aymerich appeared in my field of view. "High five!" she said. We high-fived. She crossed over to my other side. "Now shake hands," she said. We shook. Because there was no way for sensation to travel from the robot's hands to mine, the handshake was a purely visual experience. Aymerich walked away, then returned, holding up my coat. "Reach out and touch your jacket," she said. Slowly, I extended my arm, watching as my metal fingers moved toward the fabric. When they reached it, I was startled by a tingling sensation in my fingertips—a phantom touch.

"I feel something," I said. I concentrated on the feeling. It was really there—a warm, swirling electricity.

In the eighteenth century, the philosopher George Berkeley argued that reality was all in our minds. Samuel Johnson had no patience for this idea; he declared, "I refute it thus!" and kicked a stone. Two centuries later, the poet Richard Wilbur wrote a rejoinder:

> Kick at the rock, Sam Johnson,
> break your bones:
> But cloudy, cloudy is the stuff of
> stones.

"It's not real, but it doesn't matter," Slater said, watching me. "In some sense, it's a real experience."

To Thomas Metzinger, a phrase like "real experience" is a riddle to be solved. Now sixty, he resembles a German Steve Jobs, with short, steel-gray hair, architectural glasses, and a stern, sculptural face; sleek and fit, he has the formidable, watchful serenity of someone who has meditated twice a day for forty-one years. "I have a long story to tell," he said, in a gentle German accent. "I think that, in the human self-model, there are many layers. Some layers are transparent, like your bodily perceptions, which seem absolutely real. You just look"—he gestured toward a chair next to us—"and the chair is there. Others are opaque, like our cognitive layer. When we're thinking, we know that our thoughts are internal mental constructs, which could be true or false." As a philosopher, Metzinger's method has been to see if the transparent can be made opaque. In books such as "Being No One" and "The Ego Tunnel," he aims

to show that aspects of our experience which we take to be real are actually "complex forms of virtual reality" created by our brains.

Imagine that you are sitting in the cockpit of an airplane, surrounded by instruments and controls. It's a futuristic cockpit, with no windows; where the windshield would be, a computer displays the landscape. Using this cockpit, you can pilot your plane with ease. Still, there are questions you are unable to answer. Exactly what kind of plane are you flying? (It could be a Boeing 777 or an Airbus A380.) How accurate is the landscape on the screen? (Perhaps night-vision software has turned night to day.) When you throttle up the engines, you feel a rumbling and hear a roar. Does this mean the plane is accelerating—or could those effects have been simulated? Both scenarios might be true. You could be using a flight simulator to fly a real plane. This, in Metzinger's view, is how we live our lives.

The instruments in an airplane cockpit report on pitch, yaw, speed, fuel, altitude, engine status, and so on. Our human instruments report on more complicated variables. They tell us about physical facts: the status of our bodies and limbs. But they also report on mental states: on what we are sensing, feeling, and thinking; on our intentions, knowledge, and memories; on where and who we are. You might wonder who is sitting in the cockpit, controlling everything. Metzinger thinks that no one is sitting there. "We" are the instruments, and our sense of selfhood is the sum of their readouts. On the instrument panel, there is a light with a label that says "Pilot Present." When the light is on, we are self-conscious; we experience being in the cockpit and monitoring the instruments. It's easy to assume that, while you're awake, this light is always on. In fact, it's frequently off—during daydreams, during much of our mental life, which is largely automatic and unconscious—and the plane still flies.

Two facts about the cockpit are of special importance. The first is that although the cockpit controls the airplane, it is not itself an airplane. It's only a simulation—a model—of a larger, more complex, and very different machine. The implication of this fact is that the stories we tell about what happens in the cockpit—"I pulled up on the stick"; "I touched my jacket"—are very different from the reality of what is happening to the system as a whole. The second fact, harder to grasp, is that we cannot see the cockpit. Even as we consult its models of the outer and inner worlds, we don't experience ourselves as doing so; we experience ourselves as simply existing. "You cannot recognize

your self-model *as* a model," Metzinger writes, in "Being No One." "It is transparent: you look right through it. You don't see it. But you see *with* it." Our mental models of reality are like V.R. headsets that we don't know we are wearing. Through them, we experience our own inner lives and have inner sensations that feel as solid as stone. But in truth:

> Nobody ever *was* or *had* a self. All that ever existed were conscious self-models that could not be recognized as models. . . . You are such a system right now. . . . As you read these sentences, you constantly *confuse* yourself with the content of the self-model activated by your brain.

When I first encountered the ideas in "Being No One," many years ago, I thought I understood them. I had read about amputees who feel the presence of "phantom limbs," and it made sense to think that this was because their body models were out of synch with reality. I accepted that the same could be true of our inner states—just as a person without an arm can experience its presence, so a person without free will might experience using it because her "self-model" includes the idea of making choices. And yet it wasn't until I visited Slater's lab that the full force of these ideas struck me. While embodied as a robot, I had felt a phantom touch—a real-seeming product of my body model—and this had unnerved me. But wasn't I feeling phantom touches all the time? Whenever I experienced an emotion, had a thought, or made a choice, wasn't I interacting with a fiction, a story that my self-model was telling me about an infinitely stranger, perhaps impersonal process unfolding in my brain? My inner world was virtual, too.

In a Frankfurt cake shop—"They say this is where Adorno took the women he seduced; many historical conversations happened here!"—Metzinger teased out the implications of this view of existence. "Do you know what an 'illusion of control' is?" he asked, mischievously. "If people are asked to throw dice, and their task is to throw a high number, they throw the dice harder!" He believes that many experiences of being in control are similarly illusory, including experiences in which we seem to control our

own minds. Brain imaging, for example, shows that our thoughts begin before we're aware of having them. But, Metzinger said, "if a thought crosses the boundary from unconsciousness to consciousness, we feel, 'I caused this thought.' " The sensation of causing our own thoughts is also just another feature of the self-model—a phantom sensation conjured when a readout, labelled "thinking," switches from "off" to "on." If you suffer from schizophrenia, this readout may be deactivated inappropriately, and you may feel that someone else is causing your thoughts. "The mind has to explain to itself how it works," he said, spreading his hands.

Lately, Metzinger has been thinking about his own experience as a meditator. At the center of the meditative experience is the exercise and cultivation of mental autonomy: when the meditator's mind wanders, he notices and arrests that process, gently returning his mental focus to his breath. "The mind says, 'I am now re-directing the flashlight of my attention to this,' " Metzinger said. "But the thought 'I am redirecting my mind-wandering' might itself be another inner story." He leaned back in his chair and laughed. "It might be that the spiritual endeavor for liberation or detachment can lead to new illusions."

He looked at me reassuringly. "This doesn't mean that nothing is real," he said. "It doesn't mean that this is the Matrix—the simulation is running on some hardware. But it does mean that *you are not the model*. You are the whole system—the physical, biological organism in which the self-model is rendered, including its body, its social relationships, and its brain. The model is just a part of that system." The "I" we experience is smaller than, and different from, the totality of who and what we are.

It turns out that we do, in this sense, possess subtle bodies; we also inhabit subtle selves. While a person exists, he feels that he knows the world and himself directly. In fact, he experiences a model of the world and inhabits a model of himself. These models are maintained by the mind in such a way that their constructed nature is invisible. But it can sometimes be made visible, and then—to a degree—the models can be changed. Something about this discovery is deflating: it turns out that we are less substantial than we thought. Yet it can also be invigorating to understand the constructed, provisional nature of experience. Our perceptions of the world and the self feel real—how could they feel otherwise?—but we can come to understand our own role in the creation of their apparent realness. "The compensation of growing old," Virginia Woolf

writes, in "Mrs. Dalloway," is that, while "the passions remain as strong as ever," we gain "the power which adds the supreme flavour to existence,—the power of taking hold of experience, of turning it around, slowly, in the light."

In embodied virtual reality, it's sometimes possible to glimpse yourself as the virtual object you really are. In Slater's lab, two psychologists, Solène Neyret and Tania Johnston, helped me into a V.R. headset. The day before, I had been scanned by an imaging system; now, inside the virtual world, I looked into the virtual mirror to see a virtual version of myself, wearing my clothes: blue shirt, gray jeans, brown boots.

"I need you to think of a personal problem that is causing a bit of distress in your life," Neyret said, while I went through a few embodiment exercises. "You will explain the problem to Freud. Then, when you finish speaking, you will press this button"—she guided my hand to a controller—"and you will enter Freud's body. Listen carefully to yourself, and try to give yourself some advice."

The virtual world shifted. I was sitting at a desk in an expansive, glass-walled house. Outside, wildflowers punctuated a sunlit lawn. Across from me, behind his own desk, sat Sigmund Freud. There was a large red light on my desk. It turned green.

I paused, uncertain how to begin. "My mother is in a nursing home, and when I get updates from people who visit her I feel guilty," I said.

I pushed the button, and the world shifted again. Now I was Freud. I looked down at myself—white shirt, gray suit—and, in a nearby mirror, inspected my beard. Across from me, behind a desk, sat my avatar, wearing a blue shirt, gray jeans, and brown boots. He opened his mouth, then closed it. He settled his hands in his lap and looked at them.

"My mother is in a nursing home, and when I get updates from people who visit her I feel guilty," he said, in my voice.

Watching him, I felt fascination, curiosity, and pity. Was that me? He seemed like another person—a stranger. "Why do you feel guilty?" I asked, as Freud.

I pushed the button. Now I was sitting across the desk from Freud. I watched as he watched me, cocking his head. "Why do you feel guilty?" he asked. His voice was

strange—older and lower than mine.

"Because I live far away," I said, as me.

I pushed the button.

"Why do you live far away?" I asked, as Freud. "Is there a good reason?"

Soon, I fell into a rhythm. Freud and I talked for about twenty minutes. He was insightful; he said things that I'd never said to myself, in ordinary life. When I took off the headset, I was moved. I wanted to tell myself, "Good talk." From his perspective, I'd seemed different: sadder, more ordinary and comprehensible. I told myself to remember that version of me.

I looked up to see Slater, standing with Neyret and Johnston. "I think it accesses aspects of yourself that you've repressed," he said.

"It changes completely the judgment you usually apply to your internal thoughts," Neyret said.

"It's because you're physically outside of yourself, and you see yourself and hear yourself talking," Slater said. "Your natural instinct, when you see someone in front of you describing a problem, is to help them. The fact that it's you is kind of irrelevant."

"I didn't feel like I was talking to myself," I said. "It felt like a real conversation. How can that be?"

"Maybe we can have many selves," Slater said, raising an eyebrow.

Before arriving in Barcelona, I had asked Slater and Sanchez-Vives if I might try a virtual out-of-body experience. Later that day, in another part of the lab, I sat in a chair while three researchers—Pierre Bourdin, Itsaso Barberia, and Ramon Oliva—attached small vibrating motors to my wrists and ankles. Inside the V.R. headset, I saw a virtual room, with a coffee table and a working fireplace. In the virtual mirror in front of me, I saw an unsettling image: a man in a black Velcro suit, his eyes hidden behind a black V.R. headset. This was me, as I existed in the real world.

"You'll see some shapes on the coffee table," Bourdin said. "Trace them with your feet."

I heard the clicking of a computer mouse. Shapes like hieroglyphs appeared on the table, and I traced them.

"Next, you'll see some bouncing spheres," Oliva said. The mouse clicked, and small blue spheres began dancing around my body. Thanks to the motors, I felt them, light and soft, when they touched me.

"Try moving your arms and legs," Oliva said. I did, and the spheres followed.

For a few minutes, I sat enjoying my strange surroundings. Then, without warning, my point of view began to move. I was pulling backward, out of myself. First, I saw the back of my head, and then my body from behind. I began drifting toward the ceiling. From there, I looked down at my body in its chair, surrounded by swirling spheres. In my mind, silence reigned. No thoughts were equal to the experience. I didn't feel that I had left my body; I felt that my body had left me. When I took off the headset, Slater and Bourdin were watching me. "How was it?" Slater asked.

"I don't know," I said.

"How do you feel?" Bourdin asked.

"Weird," I said.

"Some people have really strong experiences," Bourdin said. "There's shouting. They grab the chair." He paused. "I think it gives you the implicit idea that you can separate your body from your soul. It's about the fear of death."

I nodded, cradling the headset in my hands.

In Frankfurt, over lunch at a Persian restaurant, I described my virtual experiences to Metzinger. I wanted to know if they had been real. Had my virtual-reality O.B.E. been a real experience? What about the sensation of touching my jacket? Had it been real?

"It's a big question, when the word 'real' makes sense," Metzinger said. His brow furrowed. "An interesting possibility is that the whole distinction between real and unreal is misguided." He gestured toward the flame of the candle on the table between

us. "In Buddhist metaphysics, there is the idea of 'emptiness.' To realize the emptiness of things is to say, 'This is neither real *nor* nonexistent.' Our perception of the candle refers to something real, in the real world. But *this* candle—the one we see—it's mental content. And yet it's also not true that the experience, the model in our minds, is unreal. It's 'empty.' 'Empty' may have been their way of saying that it's just a virtual model. 'Emptiness' could be 'virtuality.' "

Listening, I rubbed the fabric of my jacket between my fingers. The jacket was real, as were my fingers. But the exact feeling of the jacket between them, which existed, solid but cloudy in my mind—perhaps that was empty.

Metzinger had ordered Persian coffee, and it arrived on an ornate silver tray. Between the tiny, elegant cups, nearly overflowing with coffee, were dates dusted with sugar. Our waitress gave us instructions in German. "*Danke schön*," Metzinger said. "She says to have a date, then to have a sip of coffee, because that contrasts the bitterness with the sweetness." I tried a date, brushed the sugar from my fingers, and sipped my coffee. She was right.

It was getting late, and we set out for a stroll in the park. As we walked, Metzinger wondered how virtual reality, by changing how we experience ourselves, might influence religion and art. "Could you experience your sense of self as empty?" he asked. "As in, there's no self there—no control? In my own life, I find states like this tend to have a beginning and an end." A smile broke through the severity of his expression. He laughed. "You know, the coolest thing in Mel Slater's lab—I was sitting in a room in V.R. There was a crackling fire, a big mirror. And they hadn't switched the avatar on. And I looked down, and there was no body. The chair was empty. I liked that!"

The park was still and beautiful. It had rained the night before, and the sandy paths were wet. The sun was low, and our footsteps crunched on the sand. A boy rode his bicycle through a puddle; we heard the water lapping. I felt tired and excited—full of ideas. The sky was blue. The grass was green. ♦

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