

Mortal Body, Immortal Mind: Does the Brain Really Produce Consciousness?

Hans Goller

ABSTRACT

Neuroscientists keep telling us that the brain produces consciousness and consciousness does not survive brain death because it ceases when brain activity ceases. Research findings on near-death-experiences during cardiac arrest contradict this widely held conviction. They raise perplexing questions with regard to our current understanding of the relationship between consciousness and brain functions. Reports on veridical perceptions during out-of-body experiences suggest that consciousness may be experienced independently of a functioning brain and that self-consciousness may continue even after the termination of brain activity. Data on studies of near-death-experiences could be an incentive to develop alternative theories of the body-mind relation as seen in contemporary neuroscience.

INTRODUCTION

Neuroscientists argue that consciousness is associated with the activity of large groups of cell assemblies or neuronal networks that are distributed throughout the brain. Results of cerebral localization studies using neuroimaging techniques, such as functional Magnetic Resonance Imaging (fMRI), and Positron Emission Tomography (PET), support this view. These studies show that mental phenomena like thoughts, perceptions, and feelings correlate with metabolic activities in specific regions of the brain. Changes in the type of mental activity go along with changes in the type of brain activity. Without brain activity, there seems to be no mental activity. The mind appears to be rooted deep in the brain. However, up to now, we have not had the faintest idea how billions of active neurons are supposed to generate subjective phenomena like sensations, perceptions, and feelings. This puzzle constitutes one of the biggest challenges to neuroscience.¹

The technologies of functional imaging, such as PET and fMRI, provide colorful pictures of the brain, enabling us to see how it lights up in action as it performs its functions.² Nevertheless, these technologies raise important and still unresolved methodological problems. Images generated by fMRI and PET are not snapshots of a particular person's brain in action. The images indicate the brain areas where activity is believed to occur. PET and fMRI have very low spatial and temporal resolution. They localize events in the brain to cubic regions of between two and five millimetres, thus to regions in which there are hundreds of thousands of cells. If there is specialization or differentiation among these cells, then that would not show up in the picture. Additionally, we cannot be sure exactly when neural events occur. Cellular events unfold on the scale of thousandths of a second, but it can require much longer time scales (large portions of a minute) to detect and process signals for making images. For these reasons, the data from different subjects are averaged. The averaging process involves the loss of considerable information. After all, brains differ from one another no less than faces and fingerprints do. In summary, brain scans do not deliver direct information about consciousness or cognition. They do not even deliver direct representations of neural activity.³ Noë points out:

Brain scans thus represent the mind at three steps of removal: they represent physical magnitudes correlated to blood flow; the blood flow in turn is correlated to neural activity; the neural activity in turn is supposed to correlate to mental activity. If all the assumptions are accurate, a brain-scan image may contain important information about neural activity related to cognitive process. But we need to take care not to be misled by the visual, pictorial character of these images. Brain scans are not pictures of cognitive processes in the brain in action.⁴

Brain imaging techniques afford no access to the *content* of consciousness. With these techniques, we cannot read thoughts or find out what it feels like to be some other person. If you volunteered as a subject in a study of memory, the scans of your brain could not show that you were

1. Hans Goller, *Das Rätsel von Körper und Geist: Eine philosophische Deutung* (Darmstadt: Primus, 2003).

2. Alva Noë, *Out of Our Heads: Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness*, (New York: Hill and Wang, 2009), 19–24.

3. *Ibid.*

4. *Ibid.*, 24.

remembering a conversation with a traffic officer, your high school sweetheart, or a dying relative, if you did not tell the researcher and he had no data on how you usually react in those kinds of situations.⁵ Brain research can only try to discover the exact patterns of metabolic activities, which consistently go along with certain types of mental phenomena.

Research data on near-death experiences during cardiac arrest challenge the widely held conviction that consciousness is totally dependent upon a functioning brain in a functioning organism. Near-death experiences are experiences of an exceptionally lucid and enhanced form of consciousness that may follow the transient loss of all brain functions.

NEAR-DEATH EXPERIENCE AND OUT-OF-BODY EXPERIENCE

In his bestseller *Life After Life* the philosopher and medical doctor Raymond Moody offers an example of a near-death experience (NDE) that includes all of the common elements found in the reports of persons who have had such an experience:

A man is dying and, as he reaches the point of greatest physical distress, he hears himself pronounced dead by his doctor. He begins to hear an uncomfortable noise, a loud ringing or buzzing, and at the same time feels himself moving very rapidly through a long dark tunnel. After this, he suddenly finds himself outside of his own physical body, but still in the immediate physical environment, and he sees his own body from a distance, as though he is a spectator. He watches the resuscitation attempt from this unusual vantage point and is in a state of emotional upheaval.

After a while, he collects himself and becomes more accustomed to his odd condition. He notices that he still has a “body,” but one of a very different nature and with very different powers from the physical body he has left behind. Soon other things begin to happen. Others come to meet and to help him. He glimpses the spirits of relatives and friends who have already died, and a loving, warm spirit of a kind he has never encountered before—a being of light—appears before him. This being asks him a question, nonverbally, to make him evaluate his life and helps him along by showing him a panoramic, instantaneous playback of the major events of his life. At some point he finds himself approaching some sort of barrier or border, apparently representing the limit between earthly life and the next life. Yet,

5. Mario Beauregard and Denyse O’Leary, *The Spiritual Brain: A Neuroscientist’s Case for the Existence of the Soul* (New York: HarperOne, 2007), 276.

he finds that he must go back to the earth, that the time for his death has not yet come. At this point he resists, for by now he is taken up with his experiences in the afterlife and does not want to return. He is overwhelmed by intense feelings of joy, love, and peace. Despite his attitude, though, he somehow reunites with his physical body and lives.

Later he tries to tell others, but he has trouble doing so. In the first place, he can find no human words adequate to describe these unearthly episodes. He also finds that others scoff, so he stops telling other people. Still, the experience affects his life profoundly, especially his views about death and its relationship to life.⁶

Moody describes a set of nine features that define the prototype of a NDE. I will mainly focus on one particular feature, namely the out-of-body experience (OBE), because it is the only aspect of NDEs that can be objectively tested and validated.

An OBE is characterized by floating outside one's body while retaining a sense of personal identity and a heightened sense of consciousness. Most people report looking down from above at their physical bodies and perceiving from this vantage point events that were later verified by people who were present.⁷ Moody describes a typical OBE in the following way:

Frequently about the time that the doctor says, 'We've lost him or her,' the patient undergoes a complete change of perspective. He feels himself rising up and viewing his own body below.

Most people say they are not just some spot of consciousness when this happens. They still seem to be in some kind of body even though they are out of their physical bodies. They say the spiritual body has shape and form unlike our physical bodies. It has arms and a shape although most are at a loss to describe what it looks like. Some people describe it as a cloud of colors, or an energy field.⁸

A person in a spiritual body is inaudible and also invisible to the people around her. However, she can see other people and understand their thoughts completely, but they only see her material body and are not able to communicate with her. Her spiritual body is weightless and also lacks

6. Raymond A. Moody, *Life after Life: The Investigation of a Phenomenon—Survival of Bodily Death* (Harrisburg, PA: Stackpole Books, 1976), 21–23.

7. Beauregard and O'Leary, *The Spiritual Brain*, 157.

8. Raymond A. Moody, *The Light Beyond: The Extraordinary Sequel to the Classic Bestseller Life after Life* (London: Rider, 2005), 9.

solidity. Physical objects in the environment appear to move through it with ease, and she is unable to get a grip on any object or person she tries to touch.⁹ A person who has an OBE still feels herself localized in space. She has not become a pure spiritual being. Her corporeality, however, seems to be transformed.

Most of the data collected on NDEs have been obtained from so-called “retrospective studies.” In these studies, five to thirty years may have elapsed between the occurrence of the experience and its scientific investigation.¹⁰ Retrospective studies have been performed by Raymond Moody,¹¹ Michael Sabom,¹² Kenneth Ring,¹³ Peter Fenwick,¹⁴ and Hubert Knoblauch.¹⁵ The value of the testimony of those who claim to have had such experiences depends upon their truthfulness and the reliability of their memories. They themselves are convinced that what they have experienced was not a dream, fantasy, or hallucination. Most of them say that their NDE was “more real than life itself” or “more real than you and I sitting here talking about it.”¹⁶ Nonetheless, accounts of such experiences describe the “dying process,” the experience of being close to death, not death itself.

In so-called “prospective studies,” the researcher studies the participants before they have their NDEs, and thus has basic information about the individuals and a greater degree of control over the circumstances in which the experience will take place. NDEs have occurred with increasing frequency because of the improved survival rates resulting from modern

9. Moody, *Life after Life*, 44.

10. Pim van Lommel, “Near-Death Experience, Consciousness, and the Brain: A New Concept About the Continuity of Our Consciousness Based on Recent Scientific Research on Near-Death Experience in Survivors of Cardiac Arrest,” *World Futures: The Journal of General Evolution* 62, no. 1/2 (2006): 136.

11. Moody, *Life after Life*.

12. Michael Sabom, *Recollections of Death: A Medical Investigation* (New York: Harper and Row, 1982); Michael Sabom, *Light and Death: One Doctor’s Fascinating Account of Near-Death Experiences* (Grand Rapids, MI: Zondervan, 1998).

13. Kenneth Ring and Evelyn E. Valarino, *Lessons from the Light: What We Can Learn from the Near-Death Experience* (Needham, MA: Moment Point Press, 2006).

14. Peter Fenwick and Elizabeth Fenwick, *The Truth in the Light: Investigation of over 300 Near Death Experiences* (New York: Headline Book Publishing, 1996).

15. Hubert Knoblauch and Hans-Georg Soeffner, eds., *Todesnähe: Wissenschaftliche Zugänge zu einem außergewöhnlichen Phänomen* (Konstanz: Universitätsverlag Konstanz, 1999); Hubert Knoblauch, *Berichte aus dem Jenseits: Mythos und Realität der Nahtod-Erfahrung* (Freiburg: Herder, 2002).

16. Ring and Valarino, *Lessons from the Light*, 55–56.

techniques of resuscitation.¹⁷ Studies on cardiac arrest patients have been performed independently by Michael Sabom and Bruce Greyson in the US, by Sam Parnia and Peter Fenwick in England, and by Pim van Lommel in the Netherlands.

Experiences arising during a cardiac arrest shed a great deal of light on the state of the human mind at the point of death. During cardiac arrest, the clinical criteria for death are met for a variable length of time ranging from a few seconds to tens of minutes. By medical definition, patients during cardiac arrest have at least two out of the three criteria of clinical death (e.g., no heartbeat, no breathing) and often manifest the third criterion (fixed dilated pupils). This is rapidly followed by the subsequent loss of brainstem functions.¹⁸

The Dutch cardiologist Pim van Lommel and his colleagues have performed the most extensive prospective study to date. This study included 344 patients, who were successfully resuscitated after cardiac arrest in ten Dutch hospitals between 1988 and 1992.¹⁹ All patients had been determined clinically dead, as established mainly by electrocardiogram records. The study held to the following parameters:

We defined NDE as the reported memory of all impressions during a special state of consciousness, including specific elements such as out-of-body experience, pleasant feelings, and seeing a tunnel, a light, deceased relatives, or a life review. We defined clinical death as a period of unconsciousness caused by insufficient blood supply to the brain because of inadequate blood circulation, breathing, or both. If, in this situation, CPR (Cardiopulmonary Resuscitation) is not started within 5–10 minutes, irreparable damage is done to the brain and the patient will die.²⁰

Within a few days after resuscitation, a short standardized interview was performed. The patients were asked whether they recollected the

17. Pim van Lommel et al., "Near-Death Experience in Survivors of Cardiac Arrest: A Prospective Study in the Netherlands," *Lancet* 358, no. 9298 (2001); Pim van Lommel, "Near-Death Experience, Consciousness, and the Brain: A New Concept About the Continuity of Our Consciousness Based on Recent Scientific Research on Near-Death Experience in Survivors of Cardiac Arrest," *World Futures: The Journal of General Evolution* 62, no. 1/2 (2006).

18. Sam Parnia and Peter Fenwick, "Near Death Experiences in Cardiac Arrest: Visions of a Dying Brain or Visions of a New Science of Consciousness," *Resuscitation* 52, no. 1 (2002): 6.

19. Lommel et al., "Near-Death Experience in Survivors of Cardiac Arrest."

20. *Ibid.*, 2040.

period of unconsciousness, and what they recalled. Van Lommel et al.²¹ found that 282 of the 344 patients (82%) had no recollection of the period of cardiac arrest. 62 patients (18%) reported some recollection at the time of clinical death. Of these patients, 21 had a superficial NDE and 41 had a core experience. 23 patients of the core group (7% of the total group) reported what could be termed “a deep or very deep” NDE. Therefore, of 509 resuscitations, 12% resulted in a NDE and 8% in core experience. The discrepancy between the numbers reflects the fact that some individuals were resuscitated more than one time. No patients reported distressing or frightening NDEs.

At a two-year follow-up study, 19 out of the 62 patients with NDEs had died and 6 refused to be interviewed. Thus, the researchers were only able to interview 37 patients for the second time. All the patients were able to retell their experiences almost exactly as they had done two years prior. People who had a NDE showed a significant increase in their belief in an afterlife and a decrease in their fear of death as compared with people who did not have a NDE.

Lommel emphasizes that the results of his study show that medical factors cannot explain the occurrence of NDEs. Although all patients had been clinically dead, most did not have a NDE. If purely physiological factors resulting from cerebral anoxia cause a NDE, most of the patients of Lommel’s study should have had this experience. However, as only 12% of the patients recounted a NDE the purely physical causal connection seems suspect.

We found *to our surprise* that neither the duration of cardiac arrest nor the duration of unconsciousness, nor the need for intubation in complicated CPR, nor induced cardiac arrest in electrophysiological stimulation (EPS) had any influence on the frequency of NDE. Neither could we find any relationship between the frequency of NDE and administered drugs, fear of death before the arrest, nor foreknowledge of NDE, gender, religion, or education. An NDE was more frequently reported at ages lower than 60 years, and also by patients who had had more than one CPR during their hospital stay, and by patients who had experienced an NDE previously. Patients with memory defects induced by lengthy CPR reported less frequently an NDE. Good short-term memory seems to be essential for remembering an NDE.²²

21. Ibid.

22. Lommel, “Near-Death Experience, Consciousness, and the Brain,” 137.

Several theories have been proposed to explain NDEs. Van Lommel could not show that psychological, neurophysiological, or physiological factors caused these experiences after cardiac arrest. "With a purely physiological explanation such as cerebral anoxia, most patients who had been clinically dead should report an NDE. All patients in our study had been unconscious because of anoxia of the brain resulting from their cardiac arrest."²³

Van Lommel points out:

With lack of evidence for any other theories for NDE, the thus far assumed, but never proven, concept that consciousness and memories are localized in the brain should be discussed. How could a clear consciousness outside one's body be experienced at the moment that the brain no longer functions during a period of clinical death with flat EEG?²⁴

THE TIMING OF NEAR-DEATH EXPERIENCES

A crucial question is the timing of the NDEs. Did they really occur during the time of the cardiac arrest, when the EEG was flat, or might they have occurred shortly either before cardiac arrest or during the recovery period after successful resuscitation, with the patients thinking that the experience had occurred during the period of their cardiac arrest? Anecdotal reports of patients who had an OBE and were able to see, hear, and recall specific details of what happened in the emergency room during their cardiac arrest can help answer this question, especially when the hospital staff or other witnesses can verify what the patients claim to have seen and heard during their OBE. Perceptions during OBEs can, at least in principle, be checked and corroborated by independent witnesses. Do they consist of verifiable, accurate perceptions that would have been impossible to perceive from the vantage point of that person's physical body? Peter Fenwick calls this the "cutting edge question" in NDE research.²⁵ The following two cases are examples of an OBE, which occurred during cardiac arrest.

Van Lommel reports the case in which a coronary-care nurse removed

23. *Ibid.*

24. Lommel et al., "Near-Death Experience in Survivors of Cardiac Arrest," 2044.

25. Peter Fenwick, "Science and Spirituality: A Challenge for the 21st Century. The Bruce Greyson Lecture from the International Association for Near-Death Studies 2004 Annual Conference," last updated April 03, 2007. <http://iands.org/research/important-research-articles/42-dr-peter-fenwick-md-science-and-spirituality.html>.

dentures from a comatose forty-four-year-old heart-attack victim and placed them in a drawer in the crash car. The patient was revived by CPR and a week later the nurse saw him again on the cardiac ward. She reported a veridical OBE of a resuscitated patient:

During a night shift an ambulance brings in a 44-year-old cyanotic, comatose man into the coronary care unit. He had been found about an hour before in a meadow by passers-by. After admission, he receives artificial respiration without intubation, while heart massage and defibrillation are also applied. When we want to intubate the patient, he turns out to have dentures in his mouth. I remove these upper dentures and put them onto the "crash car." Meanwhile, we continue extensive CPR. After about an hour and a half the patient has sufficient heart rhythm and blood pressure, but he is still ventilated and intubated, and he is still comatose. He is transferred to the intensive care unit to continue the necessary artificial respiration. Only after more than a week do I meet again with the patient, who is by now back on the cardiac war. I distribute his medication. The moment he sees me he says: "Oh, that nurse knows where my dentures are." I am very surprised. Then he elucidates: "Yes, you were there when I was brought into hospital and you took my dentures out of my mouth and put them onto that car, it had all these bottles on it and there was this sliding drawer underneath and there you put my teeth." I was especially amazed because I remembered this happening while the man was in deep coma and in the process of CPR. When I asked further, it appeared the man had seen himself lying in bed, that he had perceived from above how nurses and doctors had been busy with CPR. He was also able to describe correctly and in detail the small room in which he had been resuscitated as well as the appearance of those present like myself. At the time that he observed the situation he had been very much afraid that we would stop CPR and that he would die. And it is true that we had been very negative about the patient's prognosis due to his very poor medical condition when admitted. The patient tells me that he desperately and unsuccessfully tried to make it clear to us that he was still alive and that we should continue CPR. He is deeply impressed by his experience and says he is no longer afraid of death. 4 weeks later he left the hospital as a healthy man.²⁶

The documentation of 35 year-old singer and songwriter Pamela Reynolds (1956–2010) provides us with one of the most scientifically corrob-

26. Lommel et al., "Near-Death Experience in Survivors of Cardiac Arrest," 2041.

rated cases of an OBE extant.²⁷ Her case is unique for two reasons. First, she had an OBE at a time when she was fully instrumented under medical observation and known to be clinically dead. Second, she was able to recall verifiable facts about her surgery that she could not have known if she were not in some way conscious when these events were taking place.²⁸

Doctors discovered a grossly swollen blood vessel in her brain stem (a giant basilar artery aneurysm) that would be fatal if it burst. Reynolds consented to a risky operation performed by Robert Spetzler in Phoenix, Arizona. Spetzler used a rare technique to treat Pam Reynolds called the “Hypothermic Cardiac Arrest,” or “Operation Standstill.” He would take Reynolds body down to a temperature so low that she was “essentially” dead, but then would bring her back to a normal temperature before irreversible damage set in. Pamela’s temperature fell to 60 degrees Fahrenheit (15.6 Celsius) as opposed to the usual 98.6 degrees Fahrenheit (37 Celsius). At such a low temperature, the swollen vessels become soft, allowing for a less risky surgery. Also, at this temperature the cooled brain can survive longer without oxygen, though it obviously cannot function in that state.

When all of Reynolds’s vital signs were “stopped,” the surgeon began to cut through her skull with a surgical saw. At that point, she reported that she felt herself “pop” outside her body and hover above the operating table. From her out-of-body position, she could see the doctors working on her “lifeless” body. She described with considerable accuracy (for a person who knew nothing of complex surgical practices) the Midas Rex bone saw used to open her skull. Reynolds also heard and reported what had happened during the operation and what the nurses in the operating room had said.²⁹

During “standstill,” Pamela’s brain was found to be “dead” according to all three clinical tests: her electroencephalogram was silent, her brainstem response was absent, and no blood flowed through her brain. Interestingly, while in this state, she encountered the “deepest” NDE of all Atlanta Study participants with a score of 27 on the Greyson’s NDE Scale.³⁰

Dr. Spetzler, Pamela’s surgeon, was interviewed along with Pamela and Dr. Sabom. Dr. Spetzler emphasized with regard to the hypothermic cardiac arrest procedure: “If you would examine that patient from a clinical perspective during that hour, that patient by all definition would be

27. Sabom, *Light and Death*, 37–52.

28. Beauregard and O’Leary, *The Spiritual Brain*, 155.

29. *Ibid.*, 154.

30. Sabom, *Light and Death*, 49.

dead. At this point there is no brain activity, no blood going through the brain. Nothing, nothing, nothing.” When asked about Pamela’s NDE, the surgeon delicately avoided verifying the occurrence remarking only that: “One thing that I learned after spending so many years of dealing with the brain is that nothing is impossible.”³¹

WHAT DOES IT MEAN TO BE OUT OF ONE’S BODY?

Is there actually something in us, which can get out, perceive, and act apart from our body? Is the self able to perceive and experience apart and at a distance from the physical body? In the Atlanta Study, 26 of the patients described their experience in these very terms. Greg, a subject of this Study, recalled his OBE experience 26 years later:

As God is my witness, I was out of my body and up by the corner ceiling of the hospital room looking down on the situation. I was trying to figure out how I could do that—be up there and be down there at the same time . . . I thought to myself, *Now this is strange*.³²

How can consciousness function outside of one’s body when the brain is clinically dead? Such a brain would be like a computer that continued to operate with its power source unplugged and its circuits detached. It could not hallucinate; it could not do anything at all.³³ Paradoxically, OBEs occur during cardiac arrest when the brain no longer functions and clinical criteria of death have been reached. These experiences are characterized by heightened, lucid awareness, logical thought processes, and robust long term memory formation. This raises perplexing questions with regard to our current understanding of the relationship between consciousness and brain processes. Sabom points out:

Here, independent verification of the accuracy of out-of-body observations, such as Pam’s stunningly accurate description of the Midas Rex skull saw used by her surgeon, lends support to the claim that the experience truly occurred apart from the body. But, frustratingly, at the same time, our scientific paradigms are not designed to entertain such a possibility.³⁴

31. *Ibid.*, 50.

32. *Ibid.*, 202.

33. Lommel, “Near-Death Experience, Consciousness, and the Brain,” 142.

34. Sabom, *Light and Death*, 202.

WHAT COULD THE NEURAL CORRELATES OF NEAR-DEATH EXPERIENCES POSSIBLY BE?

Prospective studies on cardiac arrest survivors show that NDEs occur at a time when the brain can be described at best as severely impaired, and at worst, as absent of brain activity. It is known that, in cardiac arrest, loss of cortical function precedes the rapid loss of brainstem activity. When the brain is so dysfunctional that the patient is deeply comatose, the cerebral structures, which underpin subjective experience and memory, must be severely impaired.

A globally disordered brain is not expected to be able to produce coherent thought processes, together with robust long-term memory formation. The reported NDEs in cardiac arrest, however, are not confused, disordered, chaotic, or incoherent. In fact, they indicate heightened awareness, attention and consciousness at a time when one would not expect consciousness and memory formation to occur. Any cerebral trauma leads to a period of both anterograde and retrograde amnesia. Memory can be used as a very sensitive indicator of brain injury, and the length of amnesia before and after unconsciousness is an indicator of the severity of the brain injury. Therefore, events that occur just prior to or just after loss of consciousness would not be expected to be recalled.

Complex experiences such as those reported in NDEs and OBEs should not arise or be retained in memory. Such patients would be expected to have no memories at all, as is the case in most of the cardiac arrest survivors. From a scientific point of view, the occurrence of these experiences would therefore seem highly improbable and paradoxical. However, the fact that they do occur raises some questions regarding our current views on the nature of human consciousness and its relationship with the brain.³⁵

Van Lommel emphasizes that science should attempt to explain new mysteries rather than stick with old facts and concepts. With our current medical and scientific concepts, it seems impossible to explain all aspects of the subjective experiences reported by patients with an NDE during a transient loss of all brain functions.³⁶

35. Parnia and Fenwick, "Near Death Experiences in Cardiac Arrest," 8–9.

36. Lommel, "Near-Death Experience, Consciousness, and the Brain," 145.

ATTEMPTS TO EXPLAIN NEAR-DEATH-EXPERIENCES

Are NDEs little more than fantasies or hallucinations produced by some residual activity in a dying brain? According to the *dying brain hypothesis*, all features of NDEs are brain based. They are nothing but manifestations of residual brain activity. By no means do they show that there can be consciousness independently of the brain. Without brain activity, there are no NDEs and OBEs.³⁷ Numerous attempts exist to demonstrate that NDEs are attributed to oxygen deficiency, to a heightened level of carbon dioxide in the blood, to a discharge of endorphins, or to the release of ketamine, which can trigger an OBE or the experience of a dark tunnel in some individuals. Some authors regard NDEs as phenomena that belong to the realm of psychopathology.³⁸ Advocates of the dying brain hypothesis would have to explain how a brain, which is severely impaired, in a state of disintegration or completely out of function, is actually able to produce exceptionally lucid experiences and robust memories that profoundly affect the subject's life. Those who advocate the *survival hypothesis* claim that NDEs cannot be reduced to patterns of residual brain activity. They regard these experiences as evidence for the notion that there is more to reality than matter. I will discuss two alternative interpretations of the mind-brain relation, which move beyond the mainstream conviction that the brain alone is responsible for consciousness.

(1) Pim van Lommel: *The Continuity Hypothesis of Consciousness*

For Lommel, the biggest challenge is to find an explanation for the fact that an enhanced consciousness can be experienced independently of the body during the temporary loss of all cortical and brain-stem functions. According to his continuity hypothesis, NDEs are altered states of consciousness, in which memories, self-identity, lucid thought, and emotions can be experienced independently of the unconscious body and in which (extrasen-

37. Dean Mobbs and Caroline Watt, "There Is Nothing Paranormal About Near-Death Experiences: How Neuroscience Can Explain Seeing Bright Lights, Meeting the Dead, or Being Convinced You Are One of Them," *Trends in Cognitive Sciences* 15, no. 10 (2011), doi:10.1016/j.tics.2011.07.010; Gerald M. Woerlee, *Mortal Minds: The Biology of Near-Death Experiences* (Amherst, New York: Prometheus, 2005); Gerald M. Woerlee, "Grenzerfahrungen auf dem Operationstisch: Wie wenig wir über uns Selbst und über die Funktionsweise unseres Körpers wissen," last modified November 11, 2005, <http://www.heise.de/tp/r4/artikel/21/21392/1.html>.

38. For an overview see: Pim van Lommel, *Consciousness Beyond Life. The Science of the Near-Death Experience* (New York: HarperOne, 2010), 105–35; Michael Schröter-Kunhardt, "Nah-Todeserfahrungen aus psychiatrisch-neurologischer Sicht," in Knoblauch and Soeffner, *Todesnähe*.

sory) perception outside the body remains a possibility. He prefers the term *continuity hypothesis* over the term *theory of transcendence*, because he does not believe that consciousness rises above the body. Consciousness is always present outside and often inside the body.³⁹

Lommel postulates a “nonlocal” or “endless consciousness,” a continuity of consciousness after bodily death. It cannot be localized in any particular place, not even in the brain. It is the source of our waking consciousness. Lommel uses the terms “particle” and “wave” from quantum physics to characterize waking consciousness and endless consciousness. Under normal, everyday circumstances, people experience waking consciousness (the “particle” aspect), which is just one small part of the overall nonlocal consciousness (the “wave function” aspect).⁴⁰ The waking consciousness has a biological basis because our body functions as an interface. The endless consciousness, which is rooted in a multidimensional, nonlocal space and is not limited to our brain, does not have a biological basis.⁴¹

The endless consciousness, the totality of our individual consciousness, has no beginning and no end. It already has existed before our birth and will continue to exist after our death, in a realm where time and space play no role.

This endless consciousness can be experienced under different circumstances. In life-threatening situations we speak of a near-death experience. But this term is far from ideal because enhanced consciousness can also be reported under circumstances that are not life-threatening. *Experience of insight* and *enlightenment experience* may be suitable terms as well as *religious* or *mystical experience*. But perhaps *experience of nonlocal or endless consciousness* is even better.⁴²

In addition, Lommel speaks about “transpersonal aspects of consciousness,” and compares them to the concept of the “collective consciousness” as defined by the Swiss psychiatrist Carl Gustav Jung. This form of consciousness transcends the individual and connects humans with a world beyond time and space. There are no past and no future here, no beginning and no end, no division between self and non-self. Everything is connected. “There is a boundless unity. The ‘eternal now’ or the ‘timeless

39. Lommel, *Consciousness Beyond Life*, 265–66.

40. *Ibid.*, 280.

41. *Ibid.*, 269.

42. *Ibid.*, 310–11.

moment' is consciousness."⁴³ In this view, death merely marks the end of our physical aspect. We *have* a body, but we *are* consciousness. Lommel illustrates this with an example of a death notice: "What you have perishes; what you are survives beyond time and space."⁴⁴ Death and birth may be a mere passing from one state of consciousness into another.

Lommel compares the mind-brain relation to the Internet-computer relation. The endless consciousness is like the Internet, which does not originate in the computer, but is received and made visible to our senses by the computer. The computer does not produce the Internet any more than the brain produces consciousness. The computer allows us to add information to the Internet just like the brain is capable of adding information from our body and senses to our consciousness. Like a computer, the brain functions as a receiver. If you turn the computer off, you lose access to all those Web sites. Yet the sites themselves remain available worldwide, and so it is with consciousness. It is always present. During life, we can experience aspects of consciousness in our body as our waking consciousness.⁴⁵

Consciousness contains the seeds of all the information that is stored in non-local space. It transmits information to the brain and via the brain receives information from the body and the senses.⁴⁶

And as soon as the function of the brain has been lost, as in clinical death during a cardiac arrest or during brain death, memories and consciousness do still exist, but the reception ability is lost, the connection, or interface, is interrupted. Consciousness can be experienced during such a period of a non-functioning brain, and this is what we call an NDE. So in my concept consciousness is *not physically rooted!*⁴⁷

Lommel strongly favors *panprotopsychism* as developed by David Chalmers⁴⁸ and calls it a "nonmaterialist model of the fundamental or intrinsic relationship between consciousness and matter."⁴⁹ He names his own approach "a complementary theory, like both the wave and particle aspects of light, and not a dualistic theory."⁵⁰

43. Ibid., 308.

44. Ibid., 320.

45. Ibid., 270–71.

46. Ibid., 268.

47. Lommel, "Near-Death Experience, Consciousness, and the Brain," 148.

48. David J. Chalmers, *The Conscious Mind: In Search of a Fundamental Theory* (New York; Oxford: Oxford University Press, 1996).

49. Lommel, *Consciousness Beyond Life*, 262.

Subjective (conscious) experiences and the corresponding objective physical properties are two fundamentally different manifestations of one and the same underlying deeper reality; they cannot be reduced to each other. The particle aspect, the physical aspect of consciousness in the material world, originates from the wave aspect of our consciousness from the phase-space by collapse of the wave function into particles (“objective reduction”), and these can be measured by means of EEG, MEG, fMRI, and PET scan.⁵¹

In view of that, mind and matter are merely two different manifestations of one and the same underlying reality. Lommel identifies “nonlocal space” or “vacuum” as the source of both the physical world and consciousness, and endless consciousness as the source of both waking consciousness and all other aspects of consciousness.⁵² Neuronal networks should be regarded as receivers and conveyors, not as retainers of consciousness and memories. With this conception of the mind-brain relation, all reported elements of NDEs during cardiac arrest could be explained.⁵³

According to Lommel, the brain does not produce consciousness, but maintains a causal relationship with it. Consciousness transmits information to the brain and, through the brain, receives information from the body and the senses. During cardiac arrest, consciousness can still be experienced, although the interface with the body is interrupted. The enigma of this interpretation of the mind-body relation is the postulated causal relationship between the physical body and brain on the one hand and the “physically not rooted” consciousness on the other hand. It is difficult to imagine how an immaterial consciousness would be able to transmit information to the brain and in turn receive information from the brain. Lommel employs the terms “particle” and “wave” to describe this reciprocal information exchange. Accordingly, during our life, consciousness has an aspect of waves as well as of particles. There is a permanent interaction between these two aspects of consciousness. When we die, our consciousness will no longer have an aspect of particles but only an eternal aspect of waves. The interface between our consciousness and our body is eliminated.⁵⁴

I believe that while quantum physics cannot explain the origins of our con-

50. Lommel, “Near-Death Experience, Consciousness, and the Brain,” 147.

51. Ibid.

52. Lommel, *Consciousness Beyond Life*, 309–10.

53. Lommel, “Near-Death Experience, Consciousness, and the Brain,” 147.

54. Ibid., 146.

sciousness, nonlocal consciousness does have a lot of common ground with widely accepted concepts from quantum physics. In my opinion, quantum physics can help understand the transition from consciousness in nonlocal space to embodied waking consciousness in our physical, visible world.⁵⁵

Lommel does not clearly distinguish between descriptions of phenomena on the physical level and descriptions of phenomena on the mental level. In terms of quantum physics, he seems to regard consciousness to be some kind of field phenomenon (probability waves). At the same time, he points out that the eternal wave aspect of our indestructible consciousness is inherently not measurable by physical means.⁵⁶ He also admits that it is unknown how the exact transition from nonlocal space to the physical world comes about. “This means that we will probably never have any experimental evidence for the actual transition or interface between consciousness and the brain. Quantum physics allows for several theoretical possibilities, which are all speculative to a certain degree—fundamentally difficult to prove or disprove.”⁵⁷ Consequently, nonlocal and reciprocal information exchange between consciousness and the brain will never be fully knowable or verifiable. Lommel rightly concludes that there are still more questions than answers.⁵⁸

According to Lommel, the brain does not produce consciousness nor does it retain memories. Nevertheless, in our physical world, the brain seems to be a necessary condition for our waking consciousness because it functions as its biological basis, as receiver and transmitter of information. For the endless consciousness, the source of both waking consciousness and all other aspects of consciousness, the brain is neither a necessary nor a sufficient condition.

(2) *Günter Ewald: Near-Death-Experience and the Soul*

The mathematician and physicist Ewald criticizes contemporary brain research as relying almost entirely on classical physics, which has been rendered obsolete in the past century. Therefore, neurobiology does not possess the legitimacy to make any overall statements about mind, consciousness, and the soul. It can only describe neurobiological correlates of mental phenomena. Though these correlates are medically and psychologically important, they do not tell us anything about the significance of

55. Lommel, *Consciousness Beyond Life*, 273.

56. Lommel, “Near-Death Experience, Consciousness, and the Brain,” 146.

57. Lommel, *Consciousness Beyond Life*, 274.

58. Lommel, “Near-Death Experience, Consciousness, and the Brain,” 148.

NDEs. Progress could be expected if quantum physics gained a foothold in neuroscience. Ewald searches for a link between consciousness and matter in the world of quantum physics. Nevertheless, he does not expect that all open questions about the body-mind relation will be answered that way, but it would certainly open a new view about the reality of OBEs.⁵⁹

Ewald defines the soul as an entity composed of all the properties that constitute the individuality of the human being and that are separable from the body. Self-consciousness, thinking, remembering, feeling and other psychological abilities as well as an “antenna” for extrasensory perception and communication belong to these properties. He views the soul as being temporarily detachable from the body without damage during near-death experience and irrevocably at death. This separability of soul and body constitutes the immortality of the soul. The soul of the individual is both sender and receiver of information at the same time.⁶⁰

Ewald applies two concepts from quantum physics, “entanglement” (Verschränkung) and “nonlocality” (Nichtlokalität) in order to explain out-of-body experiences and the review of life during a near-death experience. If these experiences take place during cardiac arrest without direct brain activity, then this would mean that the person leaving her body “takes with her” the ability to perceive and think as well as the memories of her own life.⁶¹ Ewald speaks about an “entanglement” between the brain-based consciousness and the soul. According to his understanding of the soul, each part of consciousness has a “twin brother” or representative in the soul with whom it is “entangled” or connected through a non-causal correlation. During an out-of-body experience, the entanglement remains intact whereas at death only the representative (the twin brother) persists (similarly, of two entangled quantum states of matter one remains existent when the other is extinguished). Entanglement means that, during an OBE, all experiences of the person are, independently of the brain, still accessible to her by means of their “duplicate” in her soul. Nonetheless, up to now, the problem of how the complexity of consciousness is to be understood has not been resolved, not even in a neurobiology enhanced by quantum physics.⁶²

Ewald calls for an extension of the view of the world as presented by quantum physics, which has been dealing with a new view of space, time,

59. Günter Ewald, *Auf den Spuren der Nahtoderfahrungen: Gibt es eine unsterbliche Seele?* (Kvelaer: Butzon & Bercker, 2011), 27.

60. *Ibid.*, 131, 41–42.

61. *Ibid.*, 137–38.

62. *Ibid.*, 131.

and matter for nearly a hundred years. Within the framework of the enhanced understanding of reality in quantum physics, even the belief in life after death is justifiable. According to Ewald's theory, OBEs are attributed to a temporary detachment of the soul from the body. The enigmatic part of his theory is the idea of a "duplicate" or "twin brother" of the brain-based consciousness in the soul as well as the concept of "entanglement" between the brain-based consciousness and its duplicate in the soul.

DISCUSSION

According to the mainstream position held by neuroscientists, consciousness cannot survive brain death, because consciousness ceases when brain activity ceases. Therefore, NDEs during a transient loss of all neural activations, which are indispensable for conscious experience and robust memory formation, are simply inconceivable. All features of NDEs and OBEs are considered to be nothing but manifestations of normal brain function gone awry during a traumatic event.⁶³

Research findings on NDEs and OBEs during cardiac arrest challenge this notion. They suggest that self-consciousness may be experienced independently of a functioning brain and that mind and self-consciousness may continue even after the termination of all brain activity. Empirical evidence for this notion would be the confirmation that OBEs actually took place during the transient loss of all brain function. Observations during OBEs, which can be confirmed, e.g. by the medical personnel, supply this evidence. There are numerous anecdotal reports of patients who had an OBE during their cardiac arrest and were able to see, hear, and recall specific details of their own resuscitation. Independent witnesses have later verified the accuracy of their perceptions. So far, the best scientifically corroborated case is that of Pamela Reynolds. During her brain surgery, no measurable activities could be detected, neither in her cerebral cortex nor in her brain stem, and no blood flowed through her brain. Pamela herself, however, dated her OBE back to the time of the loss of all her brain functions. Systematic studies under controlled experimental conditions, which objectively test and validate the OBEs, are still lacking. It is hoped that the ongoing research project AWARE (awareness during resuscitation), launched by Sam Parnia and Peter Fenwick in England, will provide further evidence. More than 25 major medical centers throughout Europe, Canada, and the United States are participating in this study,

63. See Mobbs and Watt, "There is Nothing Paranormal about Near-Death Experiences."

which is the largest study of NDEs ever conducted. Physicians and scientists are trying to test the validity of OBEs, namely claims of being able to see and hear during cardiac arrest, through the use of randomly generated hidden images that are not visible unless viewed from specific vantage points above the patient.⁶⁴ On the whole, OBEs challenge the widely held conviction that changes in the type of mental activity invariably go along with changes in the type of brain activity.

How should we deal with phenomena that science cannot sufficiently explain? To explain them within the paradigm that the brain produces consciousness, including all aspects of NDEs, one would have to assume that the brain activity underlying NDEs and OBEs must be of a thus far completely unknown kind that neuroscience can neither detect nor measure with the available techniques. This seems to be extremely unlikely. Another possibility would be to move beyond the attempts to account for NDEs and OBEs by neurobiological factors and develop new theories. Pim van Lommel and Günter Ewald have chosen this strategy. Both of them try to show that self-consciousness can be experienced without a functioning brain and that it may even continue after death. They come to the conclusion that the brain does not produce consciousness. The brain merely facilitates waking consciousness (Lommel) or the entanglement between the brain-based consciousness and the soul (Ewald). Their theories of the body-mind relation contain several concepts and analogies taken from quantum physics. The application of these concepts and analogies to explain mental phenomena is controversial and raises further questions. Hopefully, the available data on NDEs and OBEs and the theories presented by Lommel and Ewald will inspire neuroscientists, psychologists, and philosophers to develop new models of the body-mind relation.

I believe the available research findings on veridical perceptions during OBEs support the notion that consciousness represents a fundamental entity in its own right, an entity which cannot be reduced to or be convincingly explained by patterns of brain activity. Furthermore, they support the conclusion that consciousness may be experienced independently of a functioning brain and that self-consciousness may continue even after the extinction of all brain activity.

All accounts of NDEs during cardiac arrest come from people who were very close to death but who were successfully resuscitated. Their narratives are reports about the experience of coming close to death but not

64. Sam Parnia, *What Happens When We Die: A Groundbreaking Study into the Nature of Life and Death* (Carlsbad, CA: Hay House, 2008), 33.

about experiencing death itself. Nonetheless, some authors interpret these narratives as glimpses into the afterlife, as views of the “other world.” Though the reports on NDEs do not constitute any evidence for survival beyond death, they speak in favor of a warranted belief in some form of life beyond time and space.

BIBLIOGRAPHY

- Beauregard, Mario, and Denyse O’Leary. *The Spiritual Brain: A Neuroscientist’s Case for the Existence of the Soul*. New York: HarperOne, 2007.
- Chalmers, David J. *The Conscious Mind: In Search of a Fundamental Theory*. New York; Oxford: Oxford University Press, 1996.
- Ewald, Günter. *Auf den Spuren der Nahtoderfahrungen: Gibt es eine unsterbliche Seele?* Kevelaer: Butzon & Bercker, 2011.
- Fenwick, Peter. “Science and Spirituality: A Challenge for the 21st Century. The Bruce Greyson Lecture from the International Association for near-Death Studies 2004 Annual Conference.” Last updated April 03, 2007. <http://iands.org/research/important-research-articles/42-dr-peter-fenwick-md-science-and-spirituality.html>.
- , and Elizabeth Fenwick. *The Truth in the Light: Investigation of over 300 Near Death Experiences*. New York: Headline Book Publishing, 1996.
- Goller, Hans. *Das Rätsel von Körper und Geist: Eine philosophische Deutung*. Darmstadt: Primus, 2003; Darmstadt: Wissenschaftliche Buchgesellschaft, 2007, 2011.
- . “Are Near-death Experiences Evidence for the Existence of the Soul?” In *Soul: A Comparative Approach*, ed. by Christian Kanzian and Muhammad Legenhausen, 63–84. Heusenstamm: Ontos, 2010.
- Greyson, Bruce. “The Near-Death Experience Scale: Construction, Reliability, and Validity.” *Journal of Nervous and Mental Disease* 171, no. 6 (1983): 369–375.
- Knoblauch, Hubert. *Berichte aus dem Jenseits: Mythos und Realität der Nahtod-Erfahrung*. Freiburg: Herder, 2002.
- Knoblauch, Hubert, and Hans-Georg Soeffner, eds. *Todesnähe: Wissenschaftliche Zugänge zu einem außergewöhnlichen Phänomen*. Konstanz: Universitätsverlag Konstanz, 1999.
- Lommel, Pim van. *Consciousness Beyond Life. The Science of the Near-Death Experience*. New York: HarperOne, 2010.
- . “Near-Death Experience, Consciousness, and the Brain: A New Concept About the Continuity of Our Consciousness Based on Recent Scientific Research on Near-Death Experience in Survivors of Cardiac Arrest.” *World Futures: The Journal of General Evolution* 62, no. 1/2 (2006): 134–51.
- Lommel, Pim van, Ruud van Wees, Vincent Meyers, and Ingrid Elfferich. “Near-Death Experience in Survivors of Cardiac Arrest: A Prospective Study in the Netherlands.” *Lancet* 358, no. 9298 (2001): 2039–45, doi:10.1016/S0140-6736(01)07100-8.
- Mobbs, Dean and Caroline Watt. “There is Nothing Paranormal about Near-Death Experiences: How Neuroscience Can Explain Seeing Bright Lights, Meeting the Dead, or Being Convinced You Are One of Them.” *Trends in Cognitive Sciences* 15, no. 10 (2011): 447–49, doi:10.1016/j.tics.2011.07.010.
- Moody, Raymond A. *The Light Beyond: The Extraordinary Sequel to the Classic Bestseller Life after Life*. London: Rider, 2005.

- . *Life after Life: The Investigation of a Phenomenon—Survival of Bodily Death*. Harrisburg, PA: Stackpole Books, 1976.
- Noë, Alva. *Out of Our Heads: Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness*. New York: Hill and Wang, 2009.
- Parnia, Sam. *What Happens When We Die: A Groundbreaking Study into the Nature of Life and Death*. Carlsbad, CA: Hay House, 2008.
- Parnia, Sam, and Peter Fenwick. “Near Death Experiences in Cardiac Arrest: Visions of a Dying Brain or Visions of a New Science of Consciousness.” *Resuscitation* 52, no. 1 (2002): 5–11.
- Ring, Kenneth, and Evelyn E. Varalino. *Lessons from the Light: What We Can Learn from the Near-Death Experience*. Needham, MA: Moment Point Press, 2006.
- Sabom, Michael. *Light and Death: One Doctor’s Fascinating Account of Near-Death Experiences*. Grand Rapids, MI: Zondervan, 1998.
- . *Recollections of Death: A Medical Investigation*. New York: Harper and Row, 1982.
- Schröter-Kunhardt, Michael. “Nah-Todeserfahrungen aus psychiatrisch-neurologischer Sicht.” In Knoblauch and Soeffner, *Todesnähe*, 65–99.
- Woerlee, Gerald M. “Grenzerfahrungen auf dem Operationstisch: Wie wenig wir über uns Selbst und über die Funktionsweise unseres Körpers wissen.” Last modified November 11, 2005. <http://www.heise.de/tp/r4/artikel/21/21392/1.html>.
- . *Mortal Minds: The Biology of Near-Death Experiences*. Amherst; New York: Prometheus, 2005.