Response to "Could Pam Reynolds Hear?"

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ABSTRACT: The near-death experience (NDE) of Pam Reynolds is one of the most impressive and medically well-documented NDEs in the literature. It took place during an operation to remove a brain aneurism, and it included almost all the aspects of a classic NDE, including accurate visual perception of the operating theater. Furthermore, parts of the experience would seem to have occurred when no brain activity whatsoever was possible. Despite testimony to the contrary by the medical personnel involved, Gerald Woerlee has attempted to explain Reynolds' experience as a result of auditory impressions combined with an anesthesia-induced fantasy. I argue here that Woerlee's attempted explanation is simply unsupported by the documented facts of the case. I also invite Woerlee to accompany me to the Barrow Neurological Institute to participate in an empirical test under the exact auditory conditions Reynolds experienced.

KEYWORDS: Pam Reynolds, Gerald Woerlee, near-death experience, materialism, skepticism

> *Who are you going to believe? Me, or your own eyes?*
> —Groucho Marx, *Duck Soup* (Mankiewicz & McCarey, 1933)

In this article I respond to Gerald Woerlee's attempt to explain how Pam Reynolds, during her now-famous near-death experience (NDE), could have physically heard various sounds in the operating room despite being heavily anesthetized and despite having speakers inserted in her ears that emitted continuous clicking sounds at a rate of 11.3 per second at an intensity of 100 decibels.

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The NDE of then-35-year-old Reynolds is one of the most remarkable ever recorded. Woerlee's description is concerned only with her memories of accurately hearing various sounds in the operating room and, thereby, omits most of the story. In fact, Woerlee even remarked, "These are the four verifiable fragments of sounds, music, and speech that Reynolds reported subsequent to recovering evident consciousness and the ability to speak. The fact that she reported *only these things* subsequent to recovering consciousness and the ability to speak indicates that she had explicit long-term memories of these perceptions (Woerlee, p. 5, emphasis added). In fact, Reynolds reported much more than "only these things." However, Woerlee's article is concerned only with trying to provide a "normal" explanation for the veridical auditory components of Reynolds' experience, and so it is on these points that I will focus.

The experience occurred during neurosurgery at the Barrow Neurological Institute in Phoenix, Arizona, on an August morning in 1991. Reynolds was undergoing surgery for a giant aneurysm in the wall of her basilar artery located at the base of her brain. A weakness in the wall of the large artery had caused it to balloon out like a bubble on the side of a faulty inner tube. Unless removed, the eventual rupture of the aneurysm would be immediately fatal.

Reynolds had been referred to neurosurgeon Robert Spetzler of the Barrow Institute, as Spetzler had pioneered a daring surgical procedure known as hypothermic cardiac arrest that would allow Reynolds' aneurysm to be removed with a reasonable chance of success. This operation, nicknamed "standstill" by the surgeons who perform it, would require her body temperature to be lowered to 60 degrees Fahrenheit, her heartbeat and breathing stopped, the electrical activity in her brain extinguished, and the blood drained from her head. In ordinary clinical terms, Reynolds would be dead.

This extraordinary episode in the history of NDE research is described in great detail by cardiologist and pioneering NDE researcher Michael Sabom (1998) in Chapter 3 of his book *Light & Death*. As Sabom noted, the medical documentation of the events surrounding this case "*far exceeds* any recorded before and provides us with our most complete scientific glimpse yet into the near-death experience" (p. 38, emphasis original).

At 7:15 in the morning Reynolds was wheeled into the operating room, given general anesthesia to induce unconsciousness, and then prepared for surgery. Instruments were set up to monitor her blood pressure, body temperature, and heartbeat. In addition, EEG elec-

trodes were taped to her head to record brain activity in the cerebral cortex. The auditory nerve center located in the brainstem was tested repeatedly using 100-decibel clicks emitted from small speakers inserted into her ears, clicking at a rate of 11.3 clicks per second, creating a loud staccato noise in each ear separately for three-minute intervals, with the other ear exposed to "white noise masking." As long as Reynolds' brainstem was still functioning, these clicks would evoke sharp spikes on the electrogram.

By 8:40 a.m. Reynolds was ready for surgery, and over 20 physicians, nurses, and technicians had scrubbed in. Spetzler began the surgery by opening the scalp with a surgical blade and folding the scalp back to expose the skull. A nurse handed Spetzler the Midas Rex pneumatically-powered bone saw, and a loud buzzing noise filled the room as the thumb-sized motor hidden in the brass head of the bone saw revved up. Spetzler then began to carve out a section of Reynolds' skull. According to Reynolds, her experience began at about this time.

> "The next thing I recall was the sound: It was a natural *D*. As I listened to the sound, I felt it was pulling me out of the top of my head. The further out of my body I got, the more clear the tone became. I had the impression it was like a road, a frequency that you go on. . . . I remember seeing several things in the operating room when I was looking down. It was the most aware that I think I have ever been in my entire life . . . I was metaphorically sitting on Dr. Spetzler's shoulder. It was not like normal vision. It was brighter and more focused and clearer than normal vision. . . . There was so much in the operating room that I didn't recognize, and so many people.
>
> I thought the way they had my head shaved was very peculiar. I expected them to take all of the hair, but they did not. . . .
>
> The saw thing that I hated the sound of looked like an electric toothbrush and it had a dent in it, a groove at the top where the saw appeared to go into the handle, but it didn't. . . . And the saw had interchangeable blades, too, but these blades were in what looked like a socket wrench case. . . . I heard the saw crank up. I didn't see them use it on my head, but I think I heard it being used on something. It was humming at a relatively high pitch and then all of a sudden it went *Brrrrrrrrrr!* like that." (Sabom, 1998, 41)

Spetzler removed a section of bone from Reynolds' skull, exposing the outermost membrane of her brain. He cut this membrane open with scissors, and the operating microscope was swung into position. Meanwhile, a female cardiac surgeon located the femoral artery and vein in Reynolds' right groin. These vessels turned out to be too small to handle the large flow of blood required by the cardiopulmonary by-

pass machine, and so the left femoral artery and vein were prepared instead. Reynolds later claimed to remember this point in the surgery:

> "I distinctly remember a female voice saying 'We have a problem. Her arteries are too small.' And then a male voice: 'Try the other side.' It seemed to come from further down the table. I do remember wondering, 'What are they doing there, because this is brain surgery!" (Broome, 2002)

After cutting through the tough fibrous membrane, Spetzler probed deep into Reynolds' brain until he located the aneurysm on the neck of the giant basilar artery. As feared, it turned out to be, as Spetzler noted in his medical records, "extremely large and extended up into the brain" (Sabom, 1998, p. 42). The risky procedure of hypothermic cardiac arrest ("operation standstill") would unfortunately be needed.

At 10:50 a.m. the cardiac surgeon and heart-pump technicians inserted tubes into the femoral artery and vein and connected these tubes to plastic hoses leading to and from the cardiopulmonary bypass machine. Warm blood traveled from the artery into the large reservoir cylinders of the bypass machine where it was cooled before being returned to Reynolds' body. Reynolds' body temperature began to fall.

At 11:00 a.m. Reynolds' core body temperature had dropped 25 degrees, and as a result of this lowered body temperature, the cardiac monitor's warning tone indicated cardiac malfunction. Reynolds' heart began beating in the irregular, disorganized pattern known as ventricular fibrillation. Sabom (1998) described what the surgical team did next.

> Five minutes later, the remaining electrical spasms of Pam's dying heart were extinguished with massive intravenous doses of potassium chloride. Cardiac arrest was complete.
>
> As Pam's heart arrested, her brain waves flattened into complete electrocerebral silence. Brain-stem function weakened as the clicks from the ear speakers produced lower and lower spikes on the monitoring electrogram.
>
> Twenty minutes later, her core body temperature had fallen another 13 degrees to a tomblike 60 degrees Fahrenheit. The clicks from her ear speakers no longer elicited a response. Total brain shutdown.
>
> Then, at precisely 11:25 a.m., Pam was subjected to one of the most daring and remarkable surgical maneuvers ever performed in an operating room. The head of the operating table was tilted up, the cardiopulmonary bypass machine was turned off, and the blood was drained from Pam's body like oil from a car. (p. 43)

Reynolds recalled that sometime during this period she felt a sensation of being pulled quickly through a vortex that she described as being "like a tunnel but it wasn't a tunnel" (Sabom, 1998, p. 44).

> "At some point very early in the tunnel vortex I became aware of my grandmother calling me. But I didn't hear her call me with my ears. . . . It was a clearer hearing than with my ears. I trust the sense more than I trust my own ears. The feeling was that she wanted me to come to her, so I continued with no fear down the shaft. It's a dark shaft that I went through, and at the very end there was this very little tiny pinpoint of light that kept getting bigger and bigger and bigger." (Sabom, 1998, p. 44)

Reynolds described how she entered the light and, there, sensed presences which at first she could not see. Then she was able to discern various figures in the light, which slowly began to form shapes of deceased persons she could recognize.

> "I could see that one of them was my grandmother. I don't know if it was reality or projection, but I would know my grandmother, the sound of her, anytime, anywhere.
>
> Everyone I saw, looking back on it, fit perfectly into my understanding of what that person looked like at their best during their lives.
>
> I recognized a lot of people. My uncle Gene was there. So was my great-great Aunt Maggie, who was really a cousin. On Papa's side of the family, my grandfather was there. . . . They were specifically taking care of me, looking after me.
>
> They would permit me to go no further. . . . It was communicated to me—that's the best way I know how to say it, because they didn't speak like I'm speaking—that if I went all the way into the light something would happen to me physically. They would be unable to put this me back into the body me, like I had gone too far and they couldn't reconnect. So they wouldn't let me go anywhere or do anything." (Sabom, 1998, pp. 45–46)

When all the blood had drained from Reynolds' brain, the aneurysm "collapsed like a deflated balloon" (Sabom, 1998, p. 45). It was removed by Spetzler, the cardiopulmonary machine was turned back on, and warmed blood was pumped back into Reynolds' body. As her body temperature began to rise, blips on the electrogram registered the first signs of life as the brainstem began to again respond to the clicking speakers in Reynolds' ears. Soon after, waves on the EEG screen indicated electrical activity in her higher brain centers. Reynolds' body appeared to be waking up.

Then, at approximately noon, the surgical team faced a serious

problem. The initially silent heart monitor indicated Reynolds' heart was beating again but with the irregular rhythm of ventricular fibrillation. If not corrected, Reynolds' heart would be damaged within minutes. The cardiac surgeon placed the two defibrillator paddles on Reynolds' chest and shocked her heart. When 50 joules of electricity produced no response, the machine was charged with100 joules. A second jolt restored the normal heart rhythm, bringing sighs of relief from the cardiac surgical team, who were preparing to cut open her chest.

Reynolds described how her NDE came to a close:

> "My grandmother didn't take me back through the tunnel, or even send me back or ask me to go. She just looked up at me. I expected to go with her, but it was communicated to me that she just didn't think she would do that. My uncle said he would do it. He's the one who took me back through the end of the tunnel. Everything was fine. I did want to go.
>
> But then I got to the end of it and saw the thing, my body. I didn't want to get into it. . . . It looked terrible, like a train wreck. It looked like what it was: dead. I believe it was covered. It scared me and I didn't want to look at it.
>
> It was communicated to me that it was like jumping into a swimming pool. No problem, just jump right into the swimming pool. I didn't want to, but I guess I was late or something because he [the uncle] pushed me. I felt a definite repelling and at the same time a pulling from the body. The body was pulling and the tunnel was pushing. . . . It was like diving into a pool of ice water . . . It hurt!" (Sabom, 1998, p. 46)

By 12:32 p.m., Reynolds' body was warmed to a life-sustaining but still subnormal temperature of 89.6 degrees, and the bypass machine was turned off. Her surgical wounds were closed, and when she was still under general anesthesia in the operating theater, but with the clicks still emitted through the speakers in her ears (Robert Spetzler, personal communication, March 17, 2011), Reynolds reported hearing the song "Hotel California," and the line was "You can check out anytime you like, but you can never leave." The record indicates that at 2:10 p.m. she was taken to the recovery room in stable condition. Reynolds first mentioned her NDE to Spetzler several days later when he spoke to her on the usual rounds performed after surgery.

By three clinical tests—flat EEG, no brainstem activity, no blood flowing through the brain—Reynolds' brain was dead, with almost certainly no activity whatsoever. Yet Reynolds reported the *deep-*

est NDE Sabom had ever investigated. Reynolds was interviewed on CBS's television show, *48 Hours*, along with Sabom and Spetzler. As Reynolds' attending surgeon, Spetzler left no doubt about her clinical condition during hypothermic cardiac arrest: "If you would examine that patient from a clinical perspective during that hour, that patient by all definition would be dead. At this point there is no brain activity, no blood going through the brain. Nothing, nothing, nothing" (Sabom, 1998, 50).

Like the Dutch patient in the "missing dentures" case (Carter, 2010, pp. 217–219; Smit, 2008; Smit & Rivas, 2010; Van Lommel, 2010, pp. 20–21), Reynolds described seeing events from an elevated location—events that she could not have inferred by auditory means. Nor could she have seen them, as her eyes were taped shut to prevent drying. Initially, Sabom was very skeptical when he first listened to Reynolds' description of a bone saw that "looked like an electric toothbrush" with "interchangeable blades" (Sabom, 1998, p. 187). But when he received a user manual from the Midas Rex Company in Fort Worth, Texas, he was shocked at the accuracy of Reynolds' description. Photographs from the manual showed a tool that, indeed, resembled an electric toothbrush, with interchangeable blades that were stored in what Reynolds had described as a "socket wrench case" (pp. 187–9).

In addition, Reynolds reported that shortly after part of her skull was removed, she heard a female voice say "something about my veins and arteries being very small" (Sabom, 1998, p. 185), and the medical records indicate that words to this effect were, indeed, spoken. At the time, Reynolds' ears were blocked by small molded speakers inserted into her ears to monitor the auditory nerve center in her brainstem. The speakers continuously played 100-decibel-level clicks into one or the other of her ears at a rate of 11.3 per second. As a point of reference for readers, 100 decibels is about the level a symphony orchestra plays at full volume, and prolonged exposure to sound more intense than 85 decibels will cause hearing loss (Centers for Disease Control, 2011).

Steven Cordova, Intraoperative Monitoring Practitioner at the Barrow Neurological Institute, provided even more detail (personal communication, November 11, 2011). The clicks alternated in Reynolds' right and left ears at three-minute intervals. While one ear was exposed to the clicks, the other ear was exposed to "white noise masking." This masking involved a very loud, continuous hissing sound so that the "masked" ear does not hear anything, and therefore does not give

a response or brainwave; the brainstem reacts when it senses *changes* in intensity, and therefore, does not react to steady white noise.

Although Reynolds' brainstem response was absent during removal of the aneurysm, it was not yet absent when the surgeon began cutting into her skull or at the time the cardiac surgeon made the remarks that Reynolds remembered hearing. In other words, the veridical parts of Reynolds' experience—that is, the parts that others later verified to have been accurate—occurred while Reynolds was not yet clinically dead but, rather, was under heavy general anesthetic with eyes taped shut and with molded speakers playing 100-decibel level clicks into her ears.

Ability of Separated Consciousness to Hear Sound

Woerlee wrote:

> If a disembodied conscious mind can pass through several concrete floors without experiencing any apparent resistance, then it will certainly not interact in any way with the infinitely less solid air pressure variations of sound waves in air caused by speech or music. Accordingly, an apparently disembodied conscious mind is unable to hear sound waves in air. (p. 7).

Note, however, that Reynolds commented that her vision "was not like normal vision. It was brighter and more focused and clearer than normal vision" and that her hearing "was a clearer hearing than with my ears." Clearer than normal hearing is not what one would normally expect a person to report from a time when their ears were covered with tape and gauze with 100 decibel clicks in one ear and white masking noise hissing into the other.

I agree with Hameroff (2011, this issue) that "auditory consciousness without ears (and visual consciousness without eyes) . . . are not problematic, because the means by which auditory or visual consciousness occur *with* ears and eyes is unknown" (p. 27). Researchers simply have no idea how electrical and chemical activity in the brain is transformed into the conscious experience of sense perception. The everyday phenomenon of sensory experience should be considered astounding, but because it is commonplace, it is taken for granted. The fact that reported disembodied perception is relatively rare does not allow such perception to be ruled out on the *a priori* grounds that it is mysterious, because embodied perception is also deeply mysterious.

Woerlee seems to be committing the fallacy of thinking that if it

cannot be explained *how* something occurs, then that means that it therefore does not occur. This fallacy appears repeatedly in the history of science. Reports of rocks that fall from the sky—what today are known as meteorites—were dismissed by scientists for decades on the grounds that there are no rocks in the sky to fall (Westrum, 1978). For decades, geologists ridiculed Wegener's evidence for continental drift because he could offer no convincing explanation for how the landmasses moved about. And such anti-empiricism can cause great suffering: Consider that before bacteria and their role in disease were known, physicians rejected the practice of hand-washing because *it made no sense to them*, despite evidence that the practice resulted in meaningful declines in hospital deaths.

So, at the present stage of scientific understanding, little more can be said other than that disembodied perception of the surrounding environment, if it in fact occurs, is mediated via a different process than that of embodied perception. What this process may be can only be speculated, but Woerlee (2011) rejects the possibility that the process may involve telepathy or clairvoyance:

> The veridical sounds of apparatus and music are most definitely not telepathically perceived, nor are they clairvoyantly perceived with any form of paranormal perception. Gambling casinos and the experiences of the countless millions of dead and living blind and deaf people are proof that such perceptions do not exist. (p. 7)

However, not only are abilities such as telepathy and clairvoyance reported in anecdotal accounts from virtually all cultures in recorded history, but also their existence has been established in repeatable experiments conducted in laboratories all over the developed world over the past 100 years (Carter, 2007, 2012; Radin, 2007). In my forthcoming book I even mention several academic skeptics who conceded in the early 1950s that if this were any other field, the experimental evidence would have been utterly convincing by 1950. Jessica Utts, a statistician at the University of California at Davis, in her 1995 article, "An Assessment of the Evidence for Psychic Functioning," asserted that "using the standards applied to any other area of science, it is concluded that psychic functioning has been well established. The statistical results of the studies examined are far beyond what is expected by chance" (p. 3).

Skeptics of psychokenesis (PK) and other forms of psi are fond of pointing out that well-established laboratories for testing PK and other psi abilities exist in Reno, Las Vegas, and Monte Carlo. So, could

PK be used to beat the odds in the casinos? Not likely. The PK effects observed in research laboratories, although statistically significant, are simply far too weak to compete with casino odds. Physicist Nick Herbert (1993) has calculated that the odds in favor of the house on even the most favorable casino games are about 100 times larger than most of the deviations from chance observed in the PK experiments. Even the most gifted micro-PK subjects do not even come close to displaying results that would allow them to consistently beat the house (pp. 195–197).

Furthermore, even if some forms of the PK, telepathic, or precognitive effects displayed in laboratories *were* strong enough in theory to beat casinos over a long run, it is highly unlikely they would work in practice. First, psi researchers, aware of their subjects' potential for boredom and fatigue, typically limit experimental sessions to only 15 to 30 minutes. However, in order to beat the casinos over the long run, people would need to perform consistently at an optimal level, perhaps over a period of months, or even years. Second, conditions in psi experiments are designed to be as psi-conducive as possible, so they are generally quiet and relaxing with few, if any, distractions. On the other hand, casinos are *designed* to be distracting and to prevent careful thought and concentration, with bright lights, loud music, scantily clad women, and free alcohol. Replications in science are meant to be conducted in experimental conditions as nearly identical to the original experiment as possible, not in wildly different conditions.

Woerlee may object at this point that if psi abilities are usually this unimpressive, then how can near-death experiencers (NDErs) such as Reynolds use psi to accurately perceive the surrounding environment? This issue relates to a theory I have discussed at length (Carter, 2010, pp. 6–18) that the brain acts as both a receiver/transmitter and a filter of consciousness. The theory predicts that consciousness freed from the restrictions of a material brain will display enhanced abilities. Psychologist Cyril Burt (1975) has elegantly summarized this view:

> The brain is not an organ that generates consciousness, but rather an instrument evolved to transmit and limit the processes of consciousness and of conscious attention so as to restrict them to those aspects of the material environment which at any moment are crucial for the terrestrial success of the individual. In that case such phenomena as telepathy and clairvoyance would be merely instances in which some of the limitations were removed. (p. 60)

Regarding the experiences of people with blindness and deafness, whether or not such people have greater telepathic abilities than the unimpaired is an empirical matter. As such, the issue can be settled only by experiment and observation and not by *a priori* arguments. As of this time, I am aware of no experiments to test this matter, so this question remains unanswered.

Awareness During General Anesthesia

In 2007, research psychologists Emily Kelly and Edward Kelly and psychiatrist Bruce Greyson wrote,

> Studies of memory and awareness in anesthesia have been highly inconsistent, and there is no convincing evidence for adequately anesthetized patients having any explicit, or conscious, memory of events during the surgery (apart from patients who have reported such memories in connection with an NDE). (Kelly, Greyson, & Kelly, 2007, p. 388)

Of course, the key word in this quote is "adequately." It could, of course, be argued that anyone who had conscious memories during surgery was not adequately anesthetized, whether or not the anesthesiologist administered what should have been an appropriate dosage to render the patient unconscious.

The last controlled study Kelly et al. mentioned was published in 1997. Since then, a prospective study of awareness during anesthesia was performed using data from 19,575 patients, all of whom were interviewed in the recovery room and at least a week after surgery (Sebel, Bowdle, Ghoneim, Rampil, Padilla, Gan, & Domino, 2004). In general, the attending anesthesiologist was not aware of patient participation in the study. The researchers identified a total of 25 cases of awareness during anesthesia (0.13% incidence), suggesting an awareness rate of 1–2 cases per 1,000 patients. Age and sex did not influence the incidence of awareness. The authors wrote that "awareness is often associated with significant adverse psychological sequelae, including posttraumatic stress disorder. The occurrence of awareness is often the consequence of light-anesthetic techniques or smaller anesthetic doses" (Sebel et al., 2004, p. 833).

The following table, reproduced from Sebel et al. (2004, p. 836), summarizes the results, in which at least some of the 25 patients reported more than one symptom:

Table 1: *Symptoms Reported by Patients Who Experienced Anesthesia Awareness*

Variable	*n*	%
Auditory perceptions	12	48
Unable to move or breath	12	48
Anxiety/stress	9	36
Pain	7	28
Sensation of endotracheal tube	6	24
Feeling surgery without pain	2	8

Source: Sebel et al. (2004), p. 836. Reproduced by permission of Dr. Sebel and of *Anesthesia & Analgesia*.

Noteworthy from the above Table is the high frequency of anxiety, stress, and pain, all absent from Reynolds' account. Indeed, apart from one notable exception, none of the 25 descriptions Sebel et al. (2004) provided of the patients' experiences resemble the experience Reynolds reported. Some sample patient descriptions are:

> The patient recalled "a great deal of conversation." She recalled hearing conversations about her tattoos and what they found in her abdomen. She remembered being unable to move and "it was like being in a box. It was dark and I could not move at all." (p. 835)
>
> "During the surgery I became conscious. I was in total darkness; I was paralyzed. I felt as if I wanted to take a few breaths, but I couldn't. It was a terrible experience. After a few minutes I lost consciousness." (p. 835)
>
> Reported "Yes, feeling pain, cutting, someone asking for a scalpel, feeling of cutting." Worst thing was "waking up in OR while paralyzed. I woke up during the procedure and could hear the doctors talking and I could feel the pain in my wound. I was not able to move or speak and it is one of the worst scares I've had in my long history of serious illness." (p. 835)
>
> "I remember trying to talk to them and telling that I was awake. I woke up during surgery enough to know that I was in surgery and was trying to figure out a way to tell them I was awake. I knew my arms were tied and my eyes were taped shut. PANIC!!" (p. 835)

Interested readers can find all 25 patients' descriptions in Appendix A. A comparison indicates that almost all of those 25 patients' descriptions of their experiences contrast strongly with Reynolds' de-

scription of her experience that included no pain or panic and that included *visual* perception:

> "I remember seeing several things in the operating room when I was looking down. It was the most aware that I think I have ever been in my entire life . . . I was metaphorically sitting on Dr. Spetzler's shoulder. It was not like normal vision. It was brighter and more focused and clearer than normal vision. . . . There was so much in the operating room that I didn't recognize, and so many people." (Sabom, 1998, p. 41)

Only one of the 25 descriptions in Sebel et al.'s (2004) study included a visual component:

> The patient reported an "out of body experience" at some point during the surgery with her floating out of her body and watching the surgery from above. She thought it was very "weird." She thought frequently about it. (p. 835)

So, it would seem that visual experiences occur only when the patient reports an out-of-body experience (OBE). It also appears that these experiences are very different from other instances of awareness during anesthesia, in which only auditory perceptions are reported and which are frequently accompanied by darkness, anxiety, and pain—all very different from Reynolds' reported experience.

Regarding the frequency of OBEs and NDEs during anesthesia Kelly et al. (2007) wrote:

> In our collection at the University of Virginia, 23% of the computer-coded cases occurred under anesthesia, and these involved the same features that characterize other NDEs, such as having an OBE and watching medical personnel working on their body, an unusually bright or vivid light, meeting deceased persons, and—significantly—thoughts, memories, and sensations that were as clear or clearer than usual. (p. 416)

Can Semi-Conscious Aural Perception Explain Reynolds' Visual Memories?

Woerlee was able to explain Reynolds' visual memories only as "remembered perceptions of bodily sensations" (Woerlee, p. 18). In other words, he apparently believed Reynolds heard the various sounds and conversation while under the anesthetic with her eyes taped shut and later conjured up a visual image of what was going on.

Sabom (1982, 153–156) has dealt extensively with this possibility. He provided four reasons why it is highly unlikely that semi-conscious aural perception can explain the visual descriptions of resuscitations and other details of the environment so often found in NDE accounts.

First, when patients who had been under general anesthesia during a major operation have been later hypnotized and regressed back to the time of the operation, they can sometimes recall conversations among the attending physicians and nurses but not visual impressions. Such recall, even when frightening, has been reported by these patients to be of an auditory nature, quite unlike the detailed visual impressions of an NDE.

Second, the experience of a semiconscious patient undergoing resuscitation can be compared to that of a semiconscious patient undergoing elective cardioversion. In order to correct abnormal heart rhythm, patients sometimes voluntarily undergo this procedure in which electric shocks are applied to the chest. A similar technique called defibrillation uses more powerful electric shocks and is commonly used during cardiac resuscitations to correct life-threatening rhythmic disturbances of the heart. In the elective situation the patient is commonly given a sedative to render semiconsciousness and to minimize the pain of the shock. However, patients in this semiconscious state can sometimes hear nearby conversations and recall the sensations associated with the shock; for example: "It's like having everything torn out of your insides" (Sabom, 1982, p. 154). If NDEs occur when individuals are merely semiconscious, then NDErs would be expected to report similar sensations while watching defibrillation being performed on their bodies. However, the accounts are very different following an NDE, as excerpts from these three reports from Sabom (1982) illustrate:

> I could see myself jolt, but again it didn't hurt like an electric shock should hurt. . . . I wasn't hurting, I wasn't anxious. . . . I had no pain. (p. 155)
>
> They were rubbing those things together and then I bounced off the table . . . I came off the table about nine to ten inches, I seemed to arch. . . . [While watching] I seemed to be in a very peaceful state. (p. 155)
>
> I thought they had given my body too much voltage because my body jumped about two feet off the table. . . . [While watching, I felt] floating, soft, easy, comfortable, nothing wrong. (p. 155)

As described above, during Reynolds' resuscitation, the cardiac surgeon placed defibrillator paddles on Reynolds' chest and shocked her

heart. When 50 joules of electricity produced no response, the machine was charged with 100 joules. The second jolt restored normal heart rhythm.

According to Reynolds' account, she re-entered her body during the time between the two shocks, with the assistance of her deceased uncle. She reported only seeing her body react to the first jolt but actually feeling the second jolt. "I saw the body jump. Then he [her uncle] pushed me, and I *felt* it" (Broome, 2002). Reynolds' description of observing the first shock from above but feeling the second from within the body is, of course, perfectly consistent with both the OBE and non-OBE accounts above.

Ignoring the complete absence of pain in the visual accounts of defibrillation, Woerlee maintained these same observations "prove" that they are "remembered perceptions of bodily sensations." He wrote of

> highly inaccurate descriptions of events during OBEs . . . such as a person who described viewing from an OBE point of view how their body jumped up to two feet in the air as a result of the electric shock of cardioversion. There is no muscular mechanism or physical possibility by which such a two foot jump—or even a one millimeter jump, for that matter—could occur as a result of an electrical shock applied to the chest. I suggest that all such observations prove OBEs are not due to disembodiment of a separate conscious mind but are, rather, remembered perceptions of bodily sensations. (Woerlee, p. 18)

Regarding this statement, Sabom has remarked:

> Woerlee claims that such a statement by this patient has to be totally false since no one's body can jump two feet off a table while lying flat on its back. This man's statement was not a scientifically-measured assessment but was made in exaggeration for emphasis since, at this point in the interview, he was quite excited and exaggerated the "two feet" statement as most anyone would when recalling a very emotional, unusual, unexpected, and life-threatening personal event. Such exaggeration also comports with what has been found in studies evaluating the general (in)accuracy of eyewitness testimony following the experience of a life-threatening, unexpected event. (personal communication, September 24, 2011)

Recently-retired cardiologist Pim van Lommel also drew a different conclusion:

> Defibrillation causes a kind of stretching of the whole body, with the chest a bit upwards as well, but not a jump of two feet off the table. But it will be difficult to estimate the jump while watching it from above. The fact that the patient describes the detail of the rubbing

> of the paddles before the electric shock is applied to his chest makes it really possible that the defibrillation was indeed perceived from above. Most patients will not know that the paddles are rubbed with gel before defibrillation. (personal communication, June 20, 2011)

Woerlee was impressed by OBE cases that involved some inaccurate perception, but how impressive is the incidence of cases involving accurate visual impressions reported after an NDE? In 2007, NDE researcher Janice Holden searched for every case of apparently veridical perception during an NDE that had been reported in books prior to 1975 when NDEs became widely known and in scholarly sources since 1975. She found 107 such cases from 39 different publications by 37 different authors or author teams. Using the most stringent criterion—that a case would be classified as inaccurate if even *one* detail was found not to correspond to reality—Holden found that only 8% involved some inaccuracy. In contrast, 37% of the cases—almost 5 times as many—were determined to be completely accurate by independent objective sources, such as the investigation of researchers reporting the cases (Holden, 2007, pp. 193–197).

Some NDEs involve perceptual errors, and it would indeed be surprising if no errors were ever reported. Human beings, after all, are fallible. It would also be surprising if people *never* hallucinated while near death. However, as Holden (2007) remarked, her results "certainly call into question how an allegedly hallucinatory phenomenon could produce only 8 percent of cases with any apparent error whatsoever and 37 percent of cases with apparently completely accurate content that had been objectively verified" (p. 41).

Sabom provided a third reason why it is highly unlikely that semi-conscious aural perception can explain the visual descriptions of resuscitations and other details of the environment. Several persons who had described an NDE to Sabom could distinguish between semiconscious auditory perception of nearby conversation and the *subsequent* occurrence of an NDE complete with visual perception. One man found his vision fading as he suffered a heart attack. He described what he experienced as medical personnel rushed to his aid:

> "I was in total blackness and I didn't have any ability to move but I could hear well and understand. I heard them talk and I heard the guy say my pressure was zero and who it was and I heard Dr. J say, "Shall we try to get a pulse?" And I wanted to answer and tried to answer but couldn't. . . . That's when I had the experience [NDE]—*After* sound and all had gone and I couldn't hear anymore." (Sabom, 1982, p. 155; emphasis original)

Another man who had experienced both the semiconscious state with auditory perception and unconsciousness associated with an NDE compared the two situations:

> "I didn't see nothing. I just heard. This other time with the cardiac arrest [and NDE], I was looking down from the ceiling and there were no ifs, ands or buts about it." (Sabom, 1982, p. 156)

These reports show that individuals who have experienced both semiconscious hearing and NDE with visual perception could clearly distinguish between the two.

Finally, Sabom (1982) pointed out that NDEs including visual perception of the environment have been reported by individuals who were unconscious and near death while no one else was present. Obviously in these cases, NDErs' visual images could not have been the result of verbal information that the NDErs perceived during semiconsciousness and later converted into visual images, because no one was around to provide the verbal information.

Could Reynolds Have Heard via Normal Channels?

In his Addendum, Woerlee (2011) wrote:

> Nowhere in the otherwise excellent account of the Pam Reynolds experience is there any mention of her hearing the clicking sounds of the BAEP stimuli in the ear to which it was applied. Yet there is mention that the BAEP was used to determine her level of consciousness throughout her operation, clearly indicating that these stimuli were correctly applied. *This discrepancy indicates that she ignored these clicking sounds,* much as people typically ignore engine noise in an automobile or airplane. (p. 20, emphasis added)

The alternative explanation is, of course, that Reynolds did not mention hearing the loud clicks because she was unconscious due to the heavy anesthetic and was therefore unable to hear through normal sensory channels. There is no defensible basis to claim that Reynolds "undoubtedly heard these sounds" simply because brainstem auditory evoked potentials were being monitored. The conscious perception of sound is a function of the cortex, but the response to the clicks being monitored was in the brainstem. Brainstem responses—whether BAEPs or pupil constriction in response to light shone into

the eyes—do not require that the patient be conscious. Kelly et al. (2007) explained why:

> Brain areas essential to the global workplace [the idea that the essential substrate for conscious experience are high-frequency EEG oscillations linking widely separated, computationally specialized regions of the brain] are consistently deactivated individually and decoupled functionally in surgically adequate anesthesia and related states of unconsciousness. Auditory and other stimuli are still able to activate their primary receiving areas, since the sensory pathways remain relatively unimpaired, but these stimuli are no longer able to ignite the large-scale cooperative network interactions that normally accompany conscious experience. (p. 417)

In other words, it is certainly possible for the brainstem to register sound without the individual consciously hearing anything.

In 2007—in response to skeptical objections that Reynolds may have simply overheard the surgeon's remarks—Sabom added more detail to his account:

> Steven Cordova, Neuroscience Manager at the Barrow Neurological Institute, who was the intraoperative technologist responsible for inserting small molded speakers into Spetzler's patients in the early 1990s when Reynolds' surgery was performed, told me that after these speakers were molded into each external auditory canal, they were further affixed with "mounds of tape and gauze to seal securely the ear piece into the ear canal." This "tape and gauze" would "cover the whole ear pinnae" making it extremely unlikely that Reynolds could have physically overheard operating room conversation one hour and twenty minutes after anesthesia had been induced. (Sabom, 2007, 259)

Ordinary conversation is at around 60 decibels, and the 100-decibel clicks were 10,000 times more intense than that; the decibel scale is a logarithmic scale based on multiples of 10, so a sound at 70 decibels is 10 times more intense than a sound at 60 decibels. Perceived loudness depends on both intensity and frequency, so loudness is partly, but not completely, a function of intensity alone. In her testimony Reynolds neither mentioned hearing loud clicks nor struggling to hear through them.

Spetzler, Reynolds' neurosurgeon, added these words:

> "I don't think that the observations she made were based on what she experienced as she went into the operating theater. They were just not available to her. For example, the drill and so on, those things are all covered up. They aren't visible; they were inside their pack-

> ages. You really don't begin to open until the patient is completely asleep, so that you maintain a sterile environment. . . . At that stage in the operation nobody can observe, hear in that state. And I find it inconceivable that the normal senses, such as hearing, let alone the fact that she had clicking modules in each ear, that there was any way for her to hear through normal auditory pathways. I don't have an explanation for it. I don't know how it's possible for it to happen." (Broome, 2002)

The CareFusion Corporation manufactured the equipment that was used to evoke the brainstem auditory potentials during Reynolds' operation. I asked them the question, "Would a fully conscious person hear these clicks?" Technologist Michael Christie responded with regard to 95 decibel clicks, not even as loud as the 100 decibels used in Reynolds' surgery:

> 95 db NHL would be heard by an awake person. If this is the sound pressure level then it is very loud and uncomfortable for an awake person of normal hearing. I would personally ask for it to be turned down. This is very loud for a person with normal hearing. (personal communication, Sept 21, 2011)

Cordova also has weighed in. Though the following posting is listed under the name Chase Slate, Cordova has confirmed that in fact, he is the author (Steven Cordova, personal communication, September 20, 2011):

> I am the lead IONM practitioner at Barrow Neurological Institute (where the surgery was performed). I was a lead technologist back then, and am *most* familiar with the technical parameters that were used. I was actually monitoring a case in the next operating room when my colleague monitored the case in discussion.
>
> The auditory stimuli in the ipsi ear was a broad based frequency spectrum click. . . . We stimulated at a rate of 11.3/second with a pulse duration of 100 microseconds. The contralateral ear was masked with 40–60 decibel white noise. We used Hal-hen brand ear pieces (probably size 5) to introduce the stimuli, which was generated by a Nicolet brand T-300 audio generator. We then used vi-drape sticky "glue" on the inner area of the pinae of the ear, before sealing up the system with gauze and micropore tape.
>
> I know how loud we played the music in those operating rooms (we have new operating rooms now) and I know the individual team members and how loud their voices are. *I would be surprised if a repeated experiment with the exact parameters allowed a person to hear through the stimuli.* Of course none of this information is a scientific argument for the fact that she did or did not hear: what is need is an experiment.

> Now at least you have the correct parameters to determine if one *can* hear externally during auditory stimulation if you re-run the experiment. (Cordova, 2011, emphasis added)

Cordova has kindly offered to re-enact the clicking with test subjects, using the exact same parameters. I hereby invite Gerald Woerlee to travel with me to Phoenix, Arizona, where he and I will serve as test subjects in a filmed experiment. The simulation Woerlee described in his Addendum simply makes far too many arbitrary assumptions to be considered realistic. Regarding Woerlee's simulation, Cordova has remarked, "There are just too many assumptions that must be made to be equivocal in any statement about Pam's level of consciousness during the procedure without a trial with the exact parameters utilized that day. So, that being said, there is only one way to know, reproduce the exact parameters and monitor the sound levels" (Steven Cordova, personal communication, December 15, 2011). Thus, the proposed experiment is the only way to definitively settle the issue of whether or not Reynolds could have heard conversation and music via normal channels.

Concluding Remarks

The crux of this case is, of course, whether Pam Reynolds could have heard conversation and music in the operating room despite 100 decibel clicks and white noise masking in her ears and being under heavy anesthetic, and could then have used this auditory information to create highly detailed and accurate visual impressions of the operating room. Despite testimony to the contrary by the medical personnel involved, Woerlee is determined to dismiss Reynolds' experience as due to auditory impressions combined with an anesthesia-induced fantasy that somehow included almost all of the components of the classic NDE.

Why should this be so? Why are there so many "skeptics" such as Gerald Woerlee eager to debunk not just reports of psychic phenomena but also phenomena such as the NDE? As I discuss in my book, *Science and Psychic Phenomena*, this militant opposition is something peculiar to Western societies, and it is basically due to the historical conflict in the West between secular and religious members of society.

Genuine skepticism plays an important role in science, but genuine skepticism involves the *suspension* of belief, not the *refusal* of belief. So, individuals such as Woerlee are not practicing genuine skepticism

but rather pseudo-skepticism, as they strenuously defend the theory of materialism in the face of data that refute it. As the celebrated philosopher of science Karl Popper (e.g., 1965) stressed, science progresses with the refutation of theories; it follows from this statement that defending a theory by strenuously denying the data that refute it must be one of the defining characteristics of pseudo-science.

Essentially, as I argued in my first book (Carter, 2007), this debate is not primarily about evidence. Rather, the debunkers and deniers are defending an outmoded worldview in which psychic phenomena and OBEs are simply not allowed to exist. It is essential to realize that most of the deniers and pseudo-skeptics are militant atheists and secular humanists; as author of a book titled *The Unholy Legacy of Abraham,* Woerlee (2008) seems clearly to qualify as a militant atheist. For various reasons, such people display an ideological agenda that is anti-religious and anti-superstitious (Carter, in press). One of the main pillars of their opposition to religion and superstition is the philosophical doctrine of materialism, that is, the doctrine that all events have a physical cause and, therefore, that the brain produces the mind. If they conceded the existence of psychic abilities such as telepathy, and of NDEs as involving a genuine separation of mind from body, then the materialistic pillar of their opposition to religion and superstition would crumble—a development they fear would usher in a return to an age of religious fanaticism, superstition, and irrationality. This fear, in my view, explains their dogmatic denial of the evidence that proves materialism false.

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Appendix A

Descriptions of Anesthesia Awareness

1) The patient reported waking up during the operation and felt the surgeons working on her eye and could hear them talking. She tried to move and talk but could not and felt helpless. There was no pain.
2) The patient said that she heard the chief surgeon or a male voice saying "careful, careful" and "to the left." The voices "faded in and out." No other sensation or discomfort. The experience did not bother her at the time.
3) The patient recalled "a great deal of conversation." She recalled hearing conversations about her tattoos and what they found in her abdomen. She remembered being unable to move and "it was like being in a box. It was dark and I could not move at all."
4) The patient reported an "out of body experience" at some point during the surgery with her floating out of her body and watching the surgery from above. She thought it was very "weird." She thought frequently about it.
5) She remembered waking up and feeling the tube in her throat. She wanted to make sure that the anesthesiologist knew that, because she did not know whether the surgery was still going on or not.
6) "Feeling tube going down throat and could not breathe" was last thing remembered. "I tried to open my eyes and couldn't. I tried to move my fingers. I then tried to breathe and couldn't."
7) Reported choking on tube. Worst thing was "felt like couldn't breathe."
8) "During this surgery I became conscious. I was in total darkness; I was paralyzed. I felt as if I wanted to take a few breaths, but I couldn't. It was a terrible experience. After a few minutes I lost consciousness."
9) Reported "Yes, feeling pain, cutting, someone asking for scalpel, feeling of cutting." Worst thing was "waking up in OR while paralyzed." "I woke up during the procedure and could hear the doctors talking and I could feel the pain in my wound. I was not able to move or speak and it is one of the worst scares I've had in my long history of serious illness."
10) Reports "not being able to breathe, trying to move my hand to let them know I felt the mask being forced on my face and no air, couldn't breathe, finally said this is it, I'm going to die and thought to myself 'Oh well, the hell with it' and just gave up."

11) "I remember trying to talk to them and telling that I was awake." "I woke up during surgery enough to know that I was in surgery and was trying to figure out a way to tell them I was awake. I knew my arms were tied and my eyes were taped shut. PANIC!!"
12) He tried to open his eyes but couldn't; tried to move his arms, couldn't. Heard conversations in OR.
13) Experienced the sound of somebody asking about liquid on floor. Heard that the doctor forgot to connect the catheter of the bag; the floor was full of urine. Other jumbled conversations, someone was angry and yelling about it. All these ran together.
14) Recollections with lights, sounds, noises, lots of noises, pain, sound of somebody asking "Where are you going? What are you doing?" The patient was unable to talk; felt like she was in a hurricane and had a sensation of wanting to get out.
15) People were talking to each other saying things were okay. He tried to talk to tell them that he couldn't breathe. No one was paying attention. Arms felt to be fastened down, had severe chest pain.
16) He heard the doctor ask for a stent which was identified by a number. He heard conversations off in the distance. No pain, no sensation of paralysis.
17) Sensation of two flat surfaces moving on each other leaving sharp, intense pain. Felt sensation in the neck, sensation of choking and felt bone being cut away from the neck.
18) The patient said she felt the incision and characterized the awareness as having associations with pain, paralysis, or stress. Patient said she had had recurrent memories about the operation. Patient states she has awareness of "the cut" but was unable to tell anyone. Afraid the pain was going to get worse, but it didn't and then she went to sleep.
19) Claimed to remember a tube being put down his nose and vomiting. Characterized the experience as associated with pain, paralysis, or stress.
20) Patient remembers waking up on her side, unable to move, left arm suspended, with a breathing tube in her mouth. Remembers feeling pain on incision and the surgeon's voice saying "she's moving."
21) Patient told the anesthesiologist he felt pressure at the surgical site during the operation but had no pain. He also heard voices and the instruments clanging.
22) He reported hearing the sound of something being "screwed into my head." He recognized and remembered the sound when he heard the ICP monitor being removed after the operation.
23) Reports remembering feeling pain in hip and having a dream that "was interrupted by the pain."

24) Reports remembering "being intubated." Remembers "the tube in my mouth."
25) Reports awareness of intubation, "tube going down throat," as last memory before falling asleep.

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