
Editorial Commentary

“Out-of-Body Experiences” (OBEs) and Brain Localisation. A Perspective

VERNON M. NEPPE¹

ABSTRACT: Blanke et al. reported in *Nature* magazine how stimulating the right angular gyrus in a patient with a right temporal seizure focus with a 4mA or 5mA current, produced transitory out-of-body experiences (OBEs) involving seeing either legs or arms disappearing when she attempted to “inspect the illusory body or body part.” Despite their reporting that changes in visual attention and/or current amplitude in the angular gyrus could explain the

¹ MD, PhD (Med), FRSSAf, FRCPC, FFPsych, MMed, DPM, MB, BCh, DABPN (Psychiatry), Certif. ABPN Geriatric Psychiatry, Certif. ABPN Forensic Psychiatry, BA, DABFE, FACFE, DABFM, DABPS (Psychopharmacology). Director, Pacific Neuropsychiatric Institute, Seattle, WA. Adjunct Professor, Psychiatry and Human Behavior, St. Louis University, St. Louis, MO.

“phenomenological modification”, this finding produced significant press interest, as a site for the OBE was postulated. This brief paper puts this and similar findings into perspective.

1. The OBE described appears atypical for the type of subjective OBE described by Subjective Paranormal Experiences (SPEs).
2. The likely pathological angular gyrus in this patient cannot be compared with that area in normal individuals.
3. Generalisation of this one case to other humans is not warranted.
4. Additionally, a previous second case suggests more than one locality for provoking an OBE by electrocortical stimulation. When analysing comparable phenomena such as déjà vu and memory, no single localisation can be found.
5. Even when findings on subjective paranormal experiences (SPEs) including OBEs are referable to specific anomalous brain functioning, they neither confirm nor deny the veridicality of the SPEs. These may have endogenous origins within the brain like pathological hallucinations do; or a particular brain function pattern may allow experience of an outside, usually covert, reality.
6. At least four distinct nosological subtypes of déjà vu exist. Similar research on OBEs needs to be performed to demonstrate the likely subtypes that exist.

Methodologically, associative links do not imply causality. To consolidate the causality hypothesis, one should analyse SPEs and also the converse, like temporal lobe epileptic subjects. The reductionistic fallacy of OBEs being fully explained purely on the basis of stimulating a specific area of the brain is not tenable.

INTRODUCTION

On 19th September 2002, the prestigious journal, *Nature*, published a brief communication. (Blanke, Ortigue, Landis, & Seeck, 2002). Although the conclusions of the Swiss authors were conservative and preliminary, the title of the article made a radical claim: *Stimulating illusory own-body perceptions: The part of the brain that can induce out-of-body experiences has been located*.

Within days this was picked up by numerous internet groups and a variety of news agencies applying sensational titles:

BBC—British Broadcasting Corporation
(<http://news.bbc.co.uk/1/hi/health/2266740.stm>)—*Doctors create out-of-body sensations*.

Nature magazine

(<http://www.nature.com/nsu/020916/020916-8.html>)—*Electrodes trigger out-of-body experience: Stimulating brain region elicits illusion often attributed to the paranormal.*

CNN

(<http://www.cnn.com/2002/TECH/science/09/19/coolsc.outofbody/index.html>)—*Out-of-body experience clues may hide in mind. Scientists: Misfiring brain behind bizarre sensation.*

Time magazine

(<http://www.time.com/time/magazine/article/0,9171,1101020930-353578,00.html>)—*Hit The O-Spot For Out-of-Body. Had an out-of-body experience? Scientists believe they know why:* “Shamans teach that out-of-body experiences are best achieved through meditation, reflection and transcendental calm. Scientists believe they have found a less celestial source: the right angular gyrus of the brain.”

These are examples of what the media has made into major conclusions about an article that I perceive as a preliminary contribution at best. These vast “scientific” jumps require careful review as they claim radical new knowledge of the brain and the paranormal. Having myself worked a great deal with analyzing the phenomenology of déjà vu, olfactory hallucinations, subjective paranormal experiences and temporal lobe symptomatology, and having gone to great pains to indicate the dichotomous nature of brain-related explanations for such events (endogenous within the brain; or a brain patterning allowing for the appreciation of exogenous experience), I find such sensationalism premature.

This brief paper is an attempt at putting this and similar findings into perspective. I cover the following areas:

1. Definitions and subjectivity.
2. A procedural perspective.
3. The actual symptoms described.
4. The actual conclusions made in the Blanke et al. (2002) paper.
5. The angular gyrus and localisation of OBEs.
6. Comparisons: Difficulty localising symptomatology in déjà vu and memory.
7. Comparisons: Different subcategories of déjà vu.
8. Temporal lobe symptomatology, olfactory hallucinations and subjective paranormal symptomatology.

9. The phenomenological categorisation of the out-of-body experience.
10. The reductionistic fallacy.
11. Legitimate conclusions—multiple possibilities.

Definitions and subjectivity

The authors, Blanke et al. (2002), use the definition: “Out-of-body experiences (OBEs) are curious, usually brief sensations in which a person’s consciousness seems to become detached from the body and take up a remote viewing position” (Grusser & Landis, 1991; Hecquen & Ajuriaguerra, 1952).

Whereas this definition is adequate and the patient they describe fits this definition, I believe it is critical to define the OBE as a form of “subjective” experience. This allows interpretations that are as subjective as research on “hallucinations”, “flashbacks” and “déjà vu”. For this reason, I developed the term “Subjective Paranormal (Psi) Experience” (SPEs: Nepe, 1980) to emphasise the fact that such experiences need not be objectively demonstrated in the lab, but that criteria could be used to separate out “Subjective Paranormal (SP) experiences” from “non-experiences” and that patients with normal or abnormal brain functioning could be analysed for such experiences, just as they are for hallucinations or delusions, which are other kinds of *subjective experiences*.

A procedural perspective

The team of researchers at the University Hospitals of Geneva and Lausanne (Olaf Blanke, Stephanie Ortigue, Theodor Landis, Margitta Seeck from the Laboratory of Presurgical Epilepsy Evaluation, Program of Functional Neurology and Neurosurgery) stimulated areas of the brain under local anesthesia to determine exact localisations of brain function and seizure firing as a presumed precursor for performing epilepsy surgery. This procedure is common, routine under this circumstance, and done worldwide.

The research findings were based on just a single patient, which usually implies at most a Journal Letter, not a Brief Communication in a prestigious journal, as in this instance. The 43-year-old female right-handed patient had suspected right temporal lobe epilepsy: Stimulating her right side of the brain would almost certainly stimulate the non-dominant hemisphere.

The researchers demonstrated the epileptic focus two inches anterior to the stimulation site of relevance, the right angular gyrus, a little

discussed area based in the parietal lobe, but with links to the temporal lobe. The stimulation area did not evoke part of the patient's habitual seizures.

The actual symptoms described

Initial stimulations ($n = 3$; 2.0, 3.0 mA) induced subjective "sinking into the bed" or "falling from a height". Increasing the current amplitude (3.5 mA) led to "I see myself lying in bed, from above, but I only see my legs and lower trunk" plus an instantaneous feeling of "lightness" and "floating" about two metres above the bed, close to the ceiling (by definition, an OBE).

At 4.5 mA, lying down with upper body supported at an angle of 45 degrees legs outstretched, the patient reported seeing her legs "becoming shorter". With the legs bent before the stimulation (90 degree knee angle; $n = 2$; 4.0, 5.0 mA), she reported that her legs appeared to be moving quickly towards her face, and took evasive action.

When looking at her outstretched arms ($n = 2$; 4.5, 5.0 mA), the patient felt as though her left arm was shortened; but the right arm was unaffected. If both arms were in the same position but bent by 90 degrees at the elbow, she felt that her left lower arm and hand were moving towards her face ($n = 2$; 4.5, 5.0 mA). When her eyes were shut, she felt that her upper body was moving towards her legs, which were stable ($n = 2$; 4.0, 5.0 mA).

The researchers concluded that these observations indicate that "OBEs and complex somatosensory illusions can be artificially induced by electrical stimulation of the cortex," and that their

"anatomical selectivity suggest that they have a common origin in body-related processing, supported by the restriction of these visual experiences to the patient's own body. During her OBE, the patient only 'saw' that part of her body that she also felt was modified during her body-transformation experiences."

(Blanke et al., 2002)

Further, the "out-of-body and body-transformation experiences were transitory," disappearing when she attempted to "inspect the illusory body or body part."

In my opinion, these descriptions appear atypical for the SPE OBE that is seen in SP Experiences. When they are elevated above the body, they see not only their own body but the surroundings, and reports of body distortions do not play a role. Moreover, they are generally not transitory in that they are maintained if the subject attempts an "examination."

The actual conclusions made in the Blanke et al. paper

The authors (viz., Blanke et al., 2002) suggest that *changes in visual attention and/or current amplitude in the angular gyrus* could bring about these phenomenological modifications. *The authors therefore, in any event, give an alternative explanation in terms of “visual attention” changes to the angular gyrus hypothesis.* It is the media above, that have ignored the visual attention hypothesis and focussed purely on the OBE and the angular gyrus. The term “phenomenological modification” is used by the authors, not OBE in this context.

The angular gyrus and localization of OBEs

The right angular gyrus has been known to co-ordinate spatial relations (Baciu et al., 1999), and may modulate both shifts of attention within extrapersonal space and saccadic eye movements (Vuilleumier, Hester, Assal, & Regli, 1996). It may be involved in learning target positions (Kawashima, Roland, & O’Sullivan, 1995). The authors believe that based on previous neurological investigations of body-cognition disorders, the angular gyrus could be a crucial node in a larger neural circuit that mediates complex own-body perception (Blanke et al., 2002). Thus there is a theoretical link with spatial movements, and the “OBE” described may fit this framework.

However, the Blanke et al. report is just one case. A second, older case, apparently contradicts the anatomical angular gyrus finding:

“The stimulating current was shut off and the electro-corticogram showed that a slow wave four per second generalized rhythm had been set up as an after-discharge. While this was continuing the patient exclaimed: ‘Oh God! I am leaving my body!’ Dr. Karagulla, who was observing him, said he looked terrified at the time of the exclamation and made gestures as though he sought help.” (Penfield, 1955, pp. 451-465; see also Penfield, 1958)

Penfield’s temporal lobe epileptic patient subjectively felt he was having an out-of-body experience.

Thus the two cases in the literature may suggest evidence for non-localisation or more than one locality for provoking an OBE by electrocortical stimulation.

Comparisons: Difficulty localising symptomatology in déjà vu and memory

Penfield's (1955) patient was prone to attacks of déjà vu preceding his major epileptic manifestations. Given this, is déjà vu localised in the brain? Based on stimulatory work in the brain, we know that déjà vu does not apparently have one specific, consistent localisation.

Halgren, Walter, Cherlow, and Crandall (1978) evoked déjà vu by stimulating the hippocampus and hippocampal gyrus. This was unexpected, as previous déjà experience had not been evoked from the mesial temporal areas. Halgren's work involved 3,495 stimulations of 36 psychomotor epileptics, wherein 267 mental experiences were evoked. Of the 19 déjà experiences evoked, 18 occurred in patients who had previously had déjà vu as part of their aura. (Compare this with the single case in the Blanke et al. study!) Thus déjà vu is non-localisable or at least has more than one stimulatory origin (Neppe, 1981, 1983b, 1983c). As another example of non-localisability, memory in the brain involves several discrete and combined functions and cannot be located easily (Neppe, 1983c; Oyachi & Ohtsuka, 1995).

Consequently, even if purely endogenous, there could be limited localisation for OBEs as well.

Comparisons: Different subcategories of déjà vu

Neppe (1983a, 1983b) analysed déjà vu in different subtypes in great detail. He demonstrated that there are at least four phenomenologically distinct subtypes of déjà vu ($N = 89$). These corresponded to diagnostic categories, and such phenomenological experiences may be used in diagnosis and management and can explain the wide variety of déjà clinical manifestations. Temporal lobe epilepsy déjà vu occurs in some temporal lobe epileptics; associative déjà vu in so-called "normals"; déjà vu in schizophrenics reflects a further nosological category; and finally a subjective paranormal experience (SPE) déjà vu is characterised by specific anomalous time distortions in SP experients (Neppe, 1983b, 1983c).

Thus not only is déjà vu not easily localised, one can distinguish subtypes that likely have entirely different aetiologies (Neppe, 1982). This has not been done yet in OBEs and this research needs to be performed to make specific nosological conclusions.

Temporal lobe symptomatology, olfactory hallucinations and subjective paranormal symptomatology

Neppe also looked at other kinds of SPEs. He demonstrated that olfactory hallucinations of a specific kind occur in SP Experiencers and that again there is additionally a phenomenological link with the temporal lobe (Neppe, 1982, 1983a). He extended this work demonstrating more possible temporal lobe symptoms (PTLSs) are associated with ostensibly normal subjects claiming a large number of SPEs (experiencers) than with non-experiencers; and this was at both state and trait level. *These findings suggest an anomalous kind of temporal lobe functioning among the experiencers, but neither confirm nor deny the veridicality of their SPEs* (Neppe, 1979, 1983d). Like pathological hallucinations, the SPEs may have endogenous origins within the brain; alternatively, a particular brain function pattern may allow experience of an outside, usually covert, reality.

Palmer, Neppe, Nebel, and Magill (2001) have recently extended this work to the converse, namely analysing the SPEs of temporal lobe diseased patients. *This way they are attempting to establish causal links as opposed to associative links. This kind of work has not been done in OBEs and needs to prior to major conclusions.*

The phenomenological categorisation of the out of body experience

Looking at the detail required to categorise different phenomena (Neppe, 1981, used 55 different sub-parameters for déjà vu, and multidimensional scaling using median column geometry in 22 different dimensions), *it is logical to hypothesise that there may be different subcategories of OBE. These need to be analysed in detail and we could potentially demonstrate various subtypes in this way.* For example, temporoparietal OBE may have as its features patients with non-dominant complex partial seizures and cerebral cortical spatial pathology who experience their OBE usually by brain stimulation and involve not spontaneously seeing all the body plus all the environment, but specific anatomical areas which can be modulated by speech, movement and outside stimuli.

The reductionistic fallacy

The reductionistic fallacy is common in science, medical science and psychology. It implies implicit “nothing but” in front of some physical relation, with an assumed purely physical hierarchy of sciences. Psychologically, we frequently learn we are nothing but stimulus-response

and maybe organism, and that everything can be explained in our brains, genes and bodies. This is currently the default worldview of most scientists.

In this instance, the media particularly has jumped onto a cautious and preliminary statement by authors, and implied that *OBEs can be fully explained purely on the basis of stimulating a specific area of the brain*. There is no relevance to the specific, special condition of the patient who has temporal lobe seizures. Surely this is not the only patient whose angular gyrus has been stimulated? Yet, there is no mention of the other patients who also have partial (focal) epilepsy, whose brains this same research team stimulates, and who have not presumably described OBEs (otherwise surely we would be learning of the second and third cases as well.)

Furthermore, we know nothing of the parapsychological background of this patient. Does she have subjective paranormal experiences? Has she had previous spontaneous OBEs? If so, have they been qualitatively the same as the current one described? Have some of the SPEs occurred at the same time as her temporal lobe symptoms—are they state related? Have some occurred separately (i.e., she has a trait potentially linked with a pattern of brain function)? What role did the environment play? The stimulation of her brain under local anaesthesia occurred with surgeons interacting in bringing forth her description of being “out of body,” a term not, incidentally, used by the patient. In this instance, she was seeing separately two limited parts of her body—legs and, on command, arms. How different is this from the so-called phantom limb phenomenon, where patients “feel” an amputated limb?

These may seem petty points but they are not. Tiny psychological and physical features need to be recorded because they become variables that are uncontrolled in a single case history. Psi research has always paid enormous attention to detail, understanding the great confounding factors that could occur if not everything is properly controlled. *Certainly, generalisation of this one case to other humans is not warranted.*

Legitimate conclusions—multiple possibilities

Where are we now after the Blanke et al. (2002) paper? Simply, with a second reported case of stimulating an area of the brain and producing a specific qualitative out-of-body experience as a consequence. We can say the following:

1. The OBE described by Blanke et al. (2002) is significantly atypical compared with those typically reported in subjective paranormal experiences, who see not only themselves but an extended environment. Furthermore, there may also be another phenomenologically distinct category of OBE in

near-death experiencers, as well, who may recall events even while in coma—something very unphysiological indeed (Morse & Neppe, 1991). *Thus the Blanke et al. OBE may just be one OBE variant and any conclusions drawn cannot be generalisable to all OBEs.*

2. Even though the epileptic focus was two inches away from the right angular gyrus and the stimulation area did not evoke part of the patient's habitual seizures, the fact that the patient had complex partial seizures implies that *the angular gyrus cannot be compared with that area in normal individuals*, as the brain may develop compensation mechanisms to stop seizure spread, or may have silent areas of spread, or may have changed sensitivity having been provoked over years by seizures and even presumably anticonvulsant medications. Thus areas a little distant from the focus cannot legitimately be regarded as the same as they would be in normal patients without seizures.

Even given a large cohort of epileptic patients, not a single case history, these results cannot be generalised to normal subjects. And, as we cannot ethically stimulate “normals,” we will not be able to generalize this by future research.

3. We have recognised the need for normal and neuropsychiatric subjects in our research on the temporal lobe and SPEs (Palmer et al., 2001), so that *better causal links as opposed to strong statistical supportive associative links can occur*. The first work looked at “psychics” functioning normally (Neppe, 1984) prior to embarking on neuropsychiatric patients. Until the same is done for OBEs, even tentative conclusions may be premature. Certainly, a sample size of one or two complicates interpretations! Evocation of OBEs by multiple stimulations even in many subjects still would not imply source. All it implies is a link—not cause and effect.

4. *The angular gyrus is unproven as a link* with even the specific phenomenological subtype of OBE described as it is based on a single subject with demonstrable seizure pathology two inches away. Using the parallel of déjà vu and memory, out-of-body experiences may not easily be localised as a source of interaction within the brain.

5. Clearly, OBEs *should occur somewhere in the brain*. It may be linked with the temporal lobe or the angular gyrus or may involve multiple brain areas interacting.

6. Even though a certain pattern of brain function, either as a trait or state condition, may allow the experience of anomalous events, this would

neither confirm nor deny the veridicality of any kind of SPE, including the OBE, as deriving either from outside the brain, or endogenously—when the SPEs would be artifactual dysfunctions in the brain akin to hallucinations.

REFERENCES

- Baciu, M., Koenig, O., Vernier, M. P., Bedoin, N., Rubin, C., & Segebarth, C. (1999). Categorical and coordinate spatial relations: fMRI evidence for hemispheric specialization. *Neuroreport*, 10(6), 1373-1378.
- Blanke, O., Ortigue, S., Landis, T., & Seeck, M. (2002). Stimulating illusory own-body perceptions. *Nature*, 419(6904), 269-270.
- Grusser, J., & Landis, T. (1991). Visual Agnosias and Other Disturbances of Visual Perception and Cognition (pp. 297-303). Amsterdam: Macmillan.
- Halgren, E., Walter, R. D., Cherlow, D. G., & Crandall, P. H. (1978). Mental phenomena evoked by electrical stimulation of the human hippocampal formation and amygdala. *Brain*, 101, 87-117.
- Hecquen, H., & Ajuriaguerra, J. (1952). Meconnaissances et al Hallucinations Corporelles (pp. 310-343). Paris: Masson.
- Kawashima, R., Roland, P. E., & O'Sullivan, B. T. (1995). Functional anatomy of reaching and visuomotor learning: A positron emission tomography study. *Cereb Cortex*, 5(2), 111-122.
- Morse, M. L., & Neppe, V. (1991). Near-death experiences. *Lancet*, 337, 858.
- Neppe, V. M. (1979). *An investigation of the relationship between temporal lobe symptomatology and subjective paranormal experience*. MMed Psych thesis. Unpublished, University of the Witwatersrand, Johannesburg.
- Neppe, V. M. (1980). Subjective paranormal experience. *Psi*, 2(3), 2-3.
- Neppe, V. M. (1981). *A study of déjà vu experience* : PhD(Med) thesis. Unpublished, University of the Witwatersrand, Johannesburg.
- Neppe, V. M. (1982). *Olfactory hallucinations in the subjective paranormal experient*. Paper presented at the Proceedings, Centenary SPR/Jubilee PA Convention, Cambridge, England.
- Neppe, V. M. (1983a). Anomalies of smell in the subjective paranormal experient. *Psychoenergetics—Journal of Psychophysical systems* 5(1), 11-27.
- Neppe, V. M. (1983b). The causes of déjà vu. *Parapsychological Journal of South Africa* 4(1) 25-35.

- Neppe, V. M. (1983c). The psychology of déjà vu: Have I been here before? Johannesburg: Witwatersrand University Press.
- Neppe, V. M. (1983d). Temporal lobe symptomatology in subjective paranormal experiences. *Journal of the American Society for Psychical Research*, 77(1), 1-29
- Neppe, V. M. (1984). The temporal lobe and anomalous experience. *Parapsychological Journal of South Africa*, 5(1), 36-47.
- Oyachi, H., & Ohtsuka, K. (1995). Transcranial magnetic stimulation of the posterior parietal cortex degrades accuracy of memory-guided saccades in humans. *Investigations in Ophthalmological Visual Science*, 36(7), 1441-1449.
- Palmer, J., Neppe, V. M., Nebel, H., & Magill, S. (2001). A controlled analysis of subjective paranormal experiences in temporal lobe dysfunction in a neuropsychiatric population., *Proceedings of Presented Papers: The Parapsychological Association 43rd Annual Convention*. (pp. 218-234).
- Penfield, W. (1955). The Twenty-Ninth Maudsley Lecture: 'The role of the temporal cortex in certain psychical phenomena'. *Journal of Mental Science*, 101.
- Penfield, W. (1958). Functional localization in temporal and deep Sylvian areas., *Research Publications Association for Research in Nervous and Mental Disease*. (Vol. 36, pp. Ch VI, 210-226). Baltimore.
- Vuilleumier, P., Hester, D., Assal, G., & Regli, F. (1996). Unilateral spatial neglect recovery after sequential strokes. *Neurology*, 46(1), 184-189.

Pacific Neuropsychiatric Institute,
10330 Meridian Avenue N, Suite 380,
Seattle , WA 98133
USA.
URL: www.pni.org
E-mail: articles@pni.org