# Reflexive Monism

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**Abstract.** Reflexive monism is, in essence, an ancient view of how consciousness relates to the material world that has, in recent decades, been resurrected in modern form. In this paper I discuss how some of its basic features differ from both dualism and variants of physicalist and functionalist reductionism, focusing on those aspects of the theory that challenge deeply rooted presuppositions in current Western thought. I pay particular attention to the ontological status and seeming "out-thereness" of the *phenomenal world* and to how the "phenomenal world" relates to the "physical world", the "world itself", and processing in the brain. In order to place the theory within the context of current thought and debate, I address questions that have been raised about reflexive monism in recent commentaries and also evaluate competing accounts of the same issues offered by "transparency theory" and by "biological naturalism". I argue that, of the competing views on offer, reflexive monism most closely follows the contours of ordinary experience, the findings of science, and common sense.

**Key words:** Consciousness, reflexive, monism, dualism, reductionism, physicalism, functionalism, transparency, biological naturalism, phenomenal world, physical world, world itself, universe itself, brain, perceptual projection, phenomenal space, measured space, physical space, space perception, information, virtual reality, hologram, phenomenological internalism, phenomenological externalism, first person, third person, complementary

## What is Reflexive Monism?

Monism is the view that the universe, at the deepest level of analysis, is one thing, or composed of one fundamental kind of stuff. This is usually contrasted with Substance Dualism, the view found, for example in the writings of Plato and Descartes that, fundamentally, the universe is composed of two kinds of stuff, physical stuff and the stuff of soul, mind or consciousness. There are three basic ways in which the apparent differences between physical and mental "stuff" can be understood in monist terms:

1. Mind might be nothing more than a particular aspect or arrangement of physical matter (physicalism; functionalism).

2. Physical matter might be nothing more than a particular aspect or arrangement of mind (idealism).

3. Mind and physical matter might be aspects or arrangements of something more fundamental that is in itself neither mental nor physical (neutral monism; dual-aspect theory).[1]

[1] As the purpose of this paper is to give a definitive summary of Reflexive Monism, and as I have given a detailed review of the strengths and weaknesses of dualism and the varieties of monism in Velmans (2000) chapters 2 to 5, I will not repeat this review here.

*Reflexive* Monism is a dual-aspect theory (in the tradition of Spinoza) which argues that the one basic stuff of which the universe is composed has the potential to manifest both physically and as conscious experience. In its evolution from some primal undifferentiated state, the universe differentiates into distinguishable physical entities, at least some of which have the potential for conscious experience, such as human beings.[2] While remaining embedded within and dependent on the surrounding universe and composed of the same fundamental stuff, each human, equipped with perceptual and cognitive systems has an individual perspective on, or view of, both the rest of the universe and him or her self. In this sense, each human participates in a process whereby the universe differentiates into parts and becomes conscious in manifold ways of itself, making the entire process reflexive.

**A brief historical note**

In one or another form, Reflexive Monism has been present in human thought for more than 3,500 years. For example, one can find versions of it in later Vedic writings such as the Upanishads and in "The revelation of the soul of Shu", inscribed in ancient Egyptian hieroglyphs on a sarcophagus in the British Museum dating back to the period 1650—1850 B.C.[3] However, the version of it that I present below has an entirely modern source, resulting from contemporary efforts to understand how consciousness relates to the brain and external physical world in a way that is consistent with common sense, everyday experience, and the scientific findings of modern consciousness studies.

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[2] I have adopted the cautious phrase "at least some of which have the potential for conscious experience" for the following reason: RM is form of dual-aspect monism which accepts that human minds, viewed from the outside, look like brains, while, from the perspective of those who have them, the operations of mind appear as conscious experiences. In short, the human mind appears to have both exterior (physical) and interior (conscious experiential) aspects, and whatever the true nature of mind might be, it must be one that supports both these views we have of it. While this does not commit RM to panpsychism, it is entirely consistent with it. On the basis of the available evidence human minds have such dual-aspects—and it would make sense if this dual-aspect of human nature were typical of nature in general, as panpsychism or panexperientialism suggest. However, as we are not certain of the necessary and sufficient conditions for consciousness in humans, we do not as yet have grounds to rule out alternative, logical possibilities, and, as I have stressed in Velmans (2000) none of the arguments for or against reflexive monism require one to settle this issue. The dual-aspect monism that RM adopts is nevertheless very different to, say, emergent materialism (EM). According to EM, consciousness emerges only when physical matter gains higher level features of particular kinds (sufficient complexity, the ability to interact with the world in an adaptive way, etc.) making consciousness "supervenient" on such emergent physical features. According to RM, both brain states and their accompanying experiences are aspects of something more fundamental, co-emerging from the mind itself. On this view, conscious states and their neural correlates are equally basic features of the mind itself. The conditions for the *existence* of consciousness (within the mind itself) also have to be distinguished from the *added* conditions that determine *the many forms that conscious states can take*. As material forms evolve and develop in complexity, their accompanying conscious experiences co-evolve and develop in complexity. Simple cellular life for example might be conscious in some primal, biological way, while complex biological organisation might be required for the complex forms of consciousness that we recognize in our own experience (see Velmans, 2000 chapter 12 for an extensive discussion of these and related issues).

[3] See Reed (1987), pp145-150 or Velmans (2000), p280.

Being a non-reductionist dual-aspect theory, Reflexive Monism (RM) is paradigmatically different in its background assumptions from both dualism and the reductionist variants of physicalism and functionalism that currently dominate philosophical thinking in this area. I have to confess, therefore, that before I developed my own first, crude version of RM over the years 1976 to 1977, I shared the conventional assumptions about consciousness that form the departure point for the classical dualist versus reductionist debate. In particular, I took it for granted that the physical world and brain were public, objective, and observer-independent, and that conscious experiences were private, subjective, and observer-dependent. I also assumed that while physical bodies had location and extension in space, conscious experiences, being brain processes or properties, must either be without a clear location or extension, or be located and extended somewhere in the brain.

My first speculations about the relation of consciousness to the brain were similarly conventional. I was tempted, for example, by the possibility that consciousness was an emergent property of the brain (related, perhaps, to its magnetic field) that allowed disparate regions of the brain to communicate with one another, thereby enabling the brain to operate in a unified, integrated way. I was even tempted by the thought that one might be able to detect variations in the operation of consciousness by measuring variations in the brain's magnetic field.[4] However, my confidence in these, and related ideas only lasted a few days.

What changed? While human consciousness might or might not be related to the brain's magnetic field, it seemed obvious, on reflection, that I was not consciously aware of different parts of my brain, let alone how they communicate with one another. Given that these communication processes operate entirely *outside of consciousness*, it seemed odd to suggest that they were the *function* of consciousness—and given that we have very little first-person conscious knowledge of the details of our own mental processing, the same appeared to be true of the many other functions that had been (and continue to be) attributed to consciousness in the cognitive science literature, making the function of the phenomenology of consciousness in mental life deeply problematic.[5]

Even worse, on re-examination, my conventional assumptions about the separation of conscious experience and its properties from what I normally thought of as the "physical world" did not seem to match up to the *phenomenology* of my own experience! If one looks at the "physical world" it has the appearance of a *phenomenal* world composed of objects surrounding one's body located and extended in a three-dimensional space through which one can move and with which one can interact. Crucially, while gazing at the world, there appears to be no other experience of the world

[4] It turned out that a similar proposal had already been made by Sperry (1969, 1970); a similar suggestion that the function of consciousness is to "broadcast" information throughout the brain allowing its different regions to communicate was also later developed by Baars (1988) in the form of "cognitive workspace" theory, which is still a popular theory about the function of consciousness (see Baars, 2007, Dehaene & Naccache, 2001). The association of consciousness with the brain's emergent magnetic field was also later suggested by McFadden (2002) and by Pockett (2002).

[5] There are many additional problems associated with the function of conscious phenomenology, for example, the causal closure of the physical world, the difficulties of reducing conscious phenomenology to its associated physically or functionally specified neural correlates, and so on. For example, even if phenomenal consciousness does turn out to correlate with the brain's magnetic field, one cannot conclude that the phenomenal properties of consciousness somehow carry out the functions of the brain's magnetic field. As this issue is not central to the theme of this paper and given that I have discussed the problems of causation and function along with a potential way to resolve them elsewhere (see Velmans, 1991a,b, 1993a, 1996, 2000 chapters 2, 4 and 11, 2002a,b, 2003a) I won't elaborate here.

"in the brain" in *addition to* this three-dimensional phenomenal world that one can see. In sum, in terms of visual *phenomenology*, what I normally thought of as the "physical world", the "phenomenal world", "the world as experienced", and my "experience of the world" were *one and the same*! And I had no doubt that this was a communally shared experience.

It goes without saying that the everyday perceived world is not the same, in every respect, to the world as described by modern physics (in terms of quantum mechanics, relativity theory and so on). However, it is the *everyday physical world that we can see* that we normally think of as public, objective and observer-independent in the ways outlined above. The observation that this phenomenal physical world is actually *part of* conscious experience (not *apart from* it) therefore provides a very different departure point for an understanding of consciousness. But it also raises some immediate questions. *Where* is this phenomenal world? It seems to be out there in space—but is it really where it seems to be, or is it really in the brain? And what is the ontological status of this phenomenal world? Is it public, objective and observer-independent, or is it private, subjective, and observer-dependent?

Let us consider the options.

**A dualist model of perception.**

Conventional assumptions about the ontology and location of the phenomenal world have their origin in a dualist understanding of the way physical objects in the world relate to perceptual processing in subjects' brains and their consequent experiences (see Figure 1).[6]

[6] Dualist thinking is common in folk psychology, and in the Western tradition has its origins in the writings of Plato and Descartes. Prominent dualists over the last hundred years have included Wilder Penfield, Charles Sherrington and John Eccles and, within the scientific community, it persists in current discussions of the role of conscious experiences in quantum mechanics, for example in the writings of Bohr, Von Neumann, and Stapp (see Stapp, 2007a,b,c, for reviews). Within philosophy, a form of "naturalistic dualism" has also been developed by Chalmers (1996, 2007). While dualism is not commonly defended in current science and philosophy for reasons discussed in depth in Velmans (2000, chapter 2), it remains an important reference point for theories of consciousness, for example, in defining what current, alternative theories *oppose*.

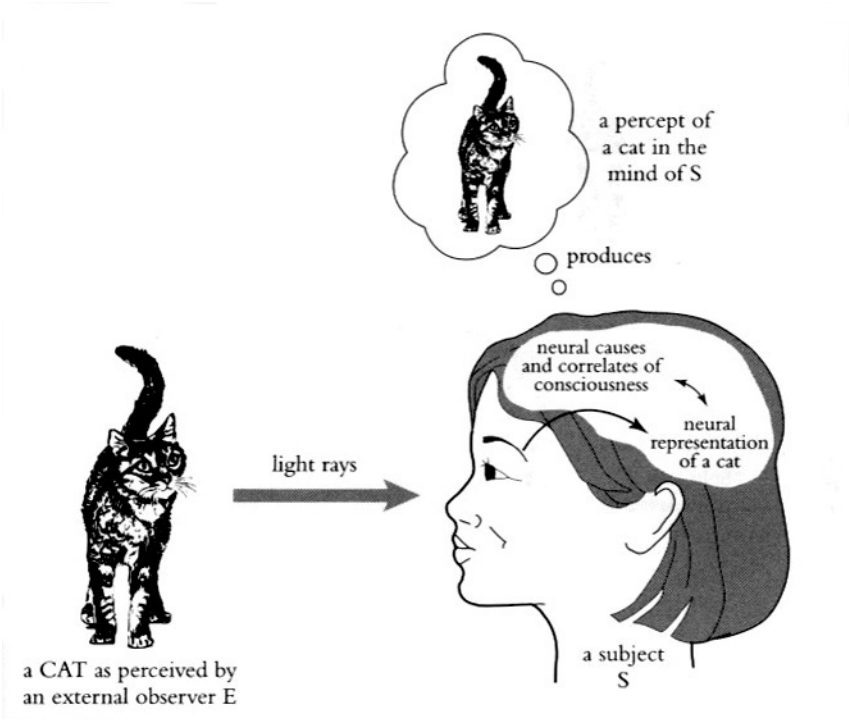


**Figure 1. A dualist model of perception**

In this model, perception involves a simple, linear, causal sequence. Viewed from the perspective of an external observer E, light rays travelling from the physical object (in this case, a cat) stimulate the subject's eye, activating her optic nerve, occipital lobes, and associated regions of her brain. Neural conditions sufficient for consciousness are formed, and result in a conscious experience (of a cat) in the subject's mind. This model of visual perception is, of course, highly oversimplified, but for now we are not interested in the details. We are interested only in the ontology of physical objects, brains and conscious experiences and in where external physical objects, brains and experiences are *placed*.[7]

[7] Figure 1 is deliberately oversimplified, as its only purpose is to illustrate the dualist separation of the objects we see in the external world from perceptual processing in brains and the consequent experiences of those objects. In particular, Figure 1 does not make explicit, a) the distinction between objects as seen and objects themselves, and b) the distinction between what can, in principle, be seen from E's perspective and what can only be inferred. The same applies to the contrasting models in Figures 2 and 3. Strictly speaking, a) it is not the cat *as seen by E* that is the source of the light reflectances from its surfaces but the *cat itself*; and b) while E can see the cat, measure the light reflected from its surface (with appropriate instruments), see the subject, and can examine the processes that take place in S's brain (again, with appropriate instruments), E can only infer the nature of S's experience on the basis of what S reports. I mention this as some commentators have agonised over these (unstated) features of the "cat diagrams", sometimes interpreting them accurately (e.g. Hoche, 2007) but sometimes mixing accuracy with inaccuracy (e.g. Van de Laar, 2003, Voerman, 2003). As Van de Laar rightly points out, it is always the *cat itself* that one is looking at although it is a phenomenal cat that one sees, which makes the phenomenal cat the *observation* and the cat itself the *observed*. In everyday life we blur these distinctions for the reason that we habitually *treat* phenomenal objects to *be* the observed objects for the reason that this is how those objects appear to us. I will return to some of these distinctions below, when they become important to the issues under discussion—and I have unravelled them in depth in Velmans (2000) chapters 6, 7, and 8.

It will be clear that there are two fundamental "splits" in this model. Firstly, the contents of consciousness are clearly separated from the material world (the conscious, perceptual "stuff" in the upper part of the diagram is separated from the material brain and the physical cat in the lower part of the diagram). This conforms to Descartes' view that the stuff of consciousness (*res cogitans*, a substance that thinks) is very different to the stuff of which the material world is made (*res extensa*, a substance that has extension and location in space). Secondly, the perceiving *subject* is clearly separated from the perceived *object* (the subject and her experiences are on the right of the diagram and the perceived object is on the left of the diagram).

This dualist model of perception supports a dualist view of the universe in which the universe is split into two realms, the material realm and the mental realm (the latter including consciousness, mind, soul and spirit). In interactionist forms of dualism these two realms interface and causally interact somewhere in the human brain.

**A reductionist (physicalist) model of perception**

The problems of assimilating such dualism into a scientific worldview are serious (cf. Velmans, 2000 chapter 2). Consequently, it is not surprising that 20th Century philosophy and science tried to naturalise dualism by arguing or attempting to show that conscious experiences are nothing more than states or functions of the brain. A reductionist model of visual perception is shown in Figure 2.

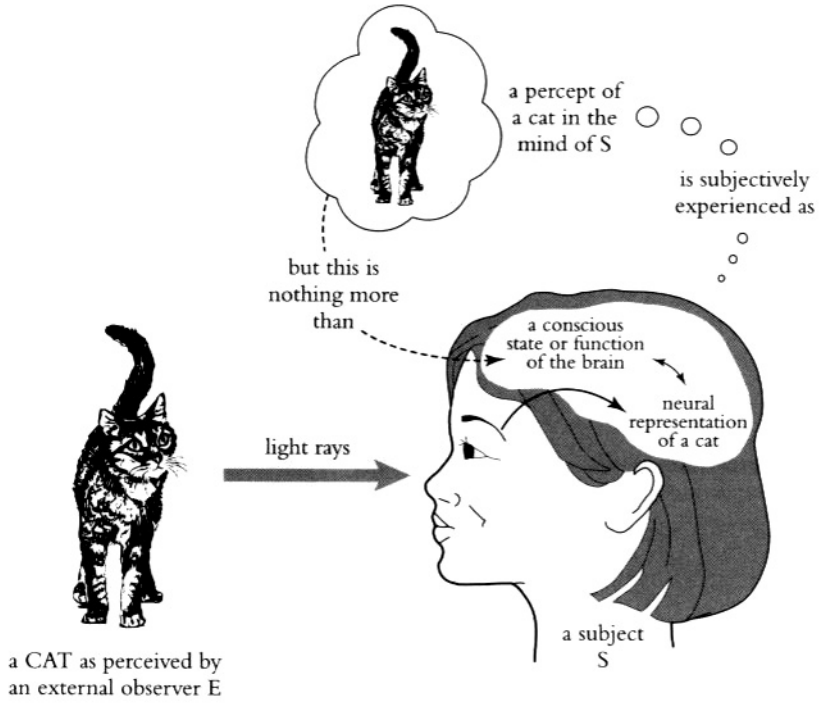


Figure 2. A reductionist model of perception

The causal sequence in Figure 2 is the same as in Figure 1, with one added step. While reductionists generally accept that the subject's experience of a cat *seems* to be insubstantial and "in the mind", they

argue that it is *really* a state or function of the brain. In short, the reductionist model in Figure 2 tries to resolve the conscious experience—physical world split by eliminating conscious experience or reducing it to something physical that E (the external observer) can in principle observe and measure. But reductionism *retains* the split (implicit in dualism) between the observer and the observed. The perceived object (on the left side of the diagram) remains quite separate from the conscious experience *of* the object (on the right side of the diagram).[8]

This supports a reductionist view of a universe composed entirely of physical material, of which conscious experiences are a tiny part (they are nothing more than the bits of human and other brains that are identified with those experiences).

Note that in spite of their disagreement about the ontology of conscious experiences, modern dualists and reductionists broadly agree about how conscious experiences *relate* to the brain and physical world. In visual perception, for example, they would agree that physical input stimuli innervate the optic nerve and visual system, forming preconscious representations of that input in the brain. If that input is attended to, and the necessary and sufficient conditions for consciousness are met, a conscious experience will result along with its neural correlates in the brain. This agreement about potentially observable neural causes and correlates makes it clear that the dualist versus reductionist dispute is more *conceptual* than *empirical*. It has more to do with *pretheoretical assumptions* about the nature of consciousness (whether it is entirely material, or whether consciousness resides in some separate, spiritual realm) than with anything observable about the brain. Consequently, one cannot easily resolve this dispute with neuroscience. The empirical *discovery* of neural causes and correlates won't settle a dispute about whether experiences are *nothing more than* their causes and/or correlates.

Note too that dualists and reductionists largely agree about where the external physical world, the brain and conscious experiences are *placed*. In spite of their dispute about *what* experiences are, they agree (roughly) about *where* they are. Reductionists, for example, take it for granted that experiences are really brain states or functions, so they must be *in the brain.* Although dualists take experiences to be immaterial (and, strictly speaking, without location or extension) they again take it for granted that these must interface and interact with the physical world somewhere in the brain. In short, the brain is as close to experiences as one can get—and if experiences are in the brain, they cannot be located in, or part of, the external physical world. One could describe this view as *phenomenological internalism*.

**A reflexive model of perception**

According to the reflexive model of perception, neither dualist nor reductionist pretheoretical assumptions about the nature of conscious experiences conform to what can be readily observed about those experiences. In fact, as I have suggested above, both sets of beliefs largely conflict with

[8] I stress again that Figure 2 is highly oversimplified and is intended only to represent some common features of positions that in some way attempt to reduce conscious experiences to states or functions of the brain. This includes eliminativist positions such as those adopted by Paul and Patricia Churchland, the "qualia denial" adopted by Daniel Dennett, the more nuanced "virtual machine functionalism" defended by Aaron Sloman, and the so-called "non-reductive" or emergent forms of physicalism, such as "biological naturalism" defended by John Searle. Given the interesting similarities and differences between biological naturalism and reflexive monism we return to biological naturalism in far more detail later in this paper.

the first-person evidence. This applies to their beliefs about (a) what conscious experiences *are like*, and (b) *where* conscious experiences seem to be placed in relation to the brain and the physical world. If this is true, it is hardly surprising that their dispute is irresolvable, and that the nature of consciousness remains a puzzle for science. A reflexive model of the nature of conscious experience and how it relates to the brain and physical world is shown in Figure 3.

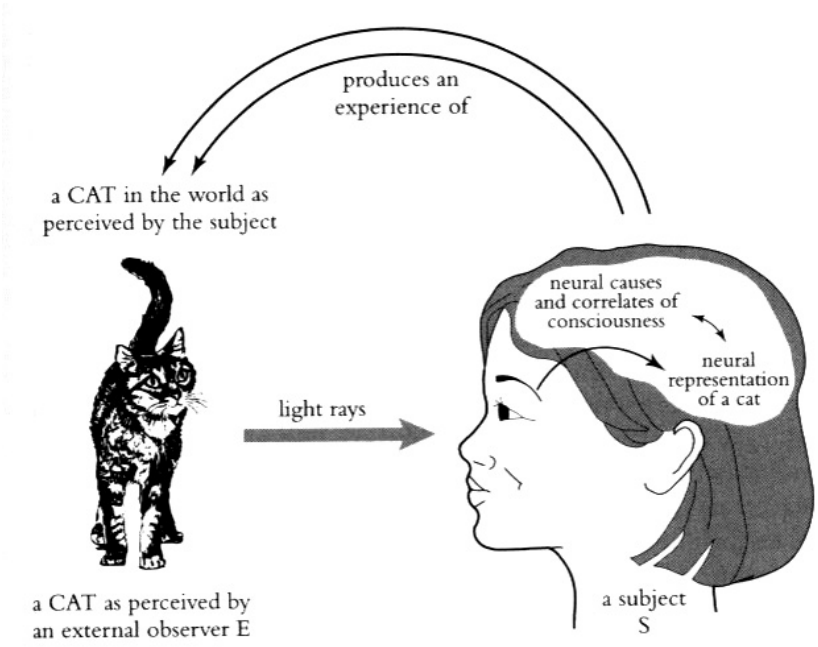


Figure 3. A reflexive model of perception

In most respects Figure 3 is the same as Figures 1 and 2. As before, there is a cat in the world (perceived by E) that is the initiating stimulus for what S observes, and the proximal neural causes and correlates of what S experiences are, as before, located in S's brain. The only difference relates to the ontology and location of S's experience. According to dualists, S's experience of a cat is a state of "stuff that thinks" that is located "nowhere"; according to reductionists, S's experience of a cat is a state or function of the brain that is located in her brain; according to the reflexive model, both of the former models are driven by assumptions about the nature of consciousness that have no basis in the phenomenological evidence with the consequence that their claims about the ontology and location of consciousness systematically discount or deny the importance of what S actually experiences. If you place a cat in front of S and ask her to describe what she experiences, she should tell you that she sees a cat in front of her in the world. This phenomenal cat literally *is* what she experiences—and she has no *other* experience *of* a cat "nowhere" or "in her brain." According the reflexive model, this other experience is a theoretical fiction, and that is why the dualist versus reductionist argument about the nature of this other experience cannot be resolved. Applying Occam's razor gets rid of both the fiction and the argument.

For reasons that I will present in a later section, the reflexive model also makes the strong claim that, insofar as experiences are anywhere, *they are roughly where they seem to be*.[9] For example, the phenomenal cat in Figure 3 both appears to be, and is out in the phenomenal world, a pain in the foot is in the experienced foot, and this perceived print on this visible page really is out here on this visible page. Nor is a pain in the foot accompanied by some other, *additional* experience *of* pain in the brain, or is this perceived print accompanied by some additional experience *of* print in the brain. In terms of phenomenology, this perceived print, and my experience *of* this print are *one and the same*.

Technically, this is a form of *phenomenological externalism*. Note, however, that although I will focus on phenomena that have apparent external location and extension for the purposes of this paper, the reflexive model is not externalist (for any doctrinal reason) about all experiences. Whether an experience appears to be located in external phenomenal space, on the body surface, inside the head, or nowhere, is an empirical matter that is entirely dependent on its phenomenology. For example, the phonemic imagery that accompanies the thought that 2+2=4 does not have a clear location, or might seem, at best, to be roughly located inside the head (see Velmans, 2000, ch6).

Note too, that, barring perceptual errors, illusions and hallucinations, perception remains reflexive wherever the experiences seem to be placed. Once preconscious perceptual processing has operated, objects and events in the external word are reflexively experienced to be located and extended in the external world, stimuli originating at the body surface are reflexively experienced to be located at the body surface, and the cognitive processes in the mind/brain that result in thoughts are reflexively experienced to be located "in the head" or "in the mind/brain" where they originate (in so far as they are located at all).

Given that the reflexive model conforms closely to everyday experience, it should be easy to grasp the essence of the argument so far. Descartes' focus on *thought* as the prime exemplar of conscious experience led him to suggest that experiences are a state of "thinking stuff" that has no location and extension in space—and reductionists commonly agree that experiences seem to have such ephemeral qualities (that is why they want to give them a more secure ontology in states or functions of the brain). While I agree that thoughts and other "inner" experiences appear to have such qualities, most other experiences do not have those qualities. On the contrary, most experienced phenomena seem to have a clear location and extension in phenomenal space.

To those immersed in dualist or reductionist modes of thought this proposed expansion of the contents of consciousness to include those aspects of the phenomenal world that we normally think of as the "physical world" may seem radical and the notion that many experiences have at least a phenomenal location and extension might appear strange. But, thus far, this proposal is hardly new. In one or another form it appears in the work of George Berkeley (1710), Immanuel Kant (1781), C.H. Lewes (1877), W.K. Clifford (1878), Ernst Mach (1885), Morton Prince (1885), William James (1890, 1904),

[9] The claim that experiences "are roughly where they seem to be", commits RM to a form of realism about conscious appearances. However this is not naïve realism. The relation of phenomenal location to *measured* location and to various descriptions of space given by physics has to be examined with care—and we return to this in detail later in the paper.

Edmund Husserl (1931), A.N. Whitehead (1932), Charles Sherrington (1942), Bertrand Russell (1948), Wolfgang Köhler (1966), and Karl Pribram (1971, 1974, 1979, 2004). Similar analyses of what consciousness *seems* to be like have also recently been given by Antti Revonsuo (1995, 2006), Steven Lehar (2003, 2006), Michael Tye (1995, 2007), Shepard & Hut (1997), Hans Dooremalen (2003), Jeffrey Gray (2004), Rupert Sheldrake (2005), and Ted Honderich (2006).

William James (1904) for example, suggests that to convince oneself about where experiences are the observer only needs to

"... begin with a perceptual experience, the 'presentation', so called, of a physical object, his actual field of vision, the room he sits in, with the book he is reading as its centre, and let him for the present treat this complex object in the commonsense way as being 'really' what it seems to be, namely, a collection of physical things cut out from an environing world of other physical things with which these physical things have actual or potential relations. Now at the same time it is just those self-same things which his mind, as we say, perceives, and the whole philosophy of perception from Democritus's time downwards has been just one long wrangle over the paradox that what is evidently one reality should be in two places at once, both in outer space and in a person's mind. 'Representative' theories of perception[10] avoid the logical paradox, but on the other hand they violate the reader's sense of life which knows no intervening mental image but seems to see the room and the book immediately just as they physically exist".

James placed his trust in the "reader's sense of life" and developed a form of "neutral monism"[11] to support it. But as he points out, the observation that the phenomenal world *seems* to be out-there beyond the body surface can be interpreted in a number of different ways:

1. It might be that the phenomenal world seems to be out-there beyond the body surface but it is really in a mind that has no location and extension.
2. It might be that the phenomenal world seems to be out-there beyond the body surface but it is really in the brain.
3. It might be that the phenomenal world really is out-there where it seems to be.
4. It might be (to quote James) "that what is evidently one reality should be in two places at once, both in outer space and in a person's mind."

As noted above, dualism adopts 1, physicalist reductionism adopts 2, and reflexive monism (like James) adopts 3. In ways that I will make clear, RM also makes sense of 4.

[10] Representative theories for James are those that identify the experience of an external object or event with in internal representation or image of that experience or event in the mind.

[11] Unlike reflexive monism (a form of dual-aspect theory in the tradition of Spinoza), neutral monism of the kind adopted by Mach (1885), James (1904) and Russell (1948) argues that mental events and physical ones are not aspects of some more *fundamental* reality but simply different ways of *construing* the world as-perceived. On this view, there is only one, neutral stuff of which the perceived world is composed, which Mach refers to as "sensations", James as "pure experience," and Russell, as "events". Although the terms they use to describe the perceived world differ, the central argument used to support neutral monism is the same: What we observe in the world is neither intrinsically mental nor physical. Rather, we *judge* what we experience to be "mental" or "physical" depending on the network of relationships under consideration. For an evaluation of this position see Velmans (2000) chapter 3.

Although options 1 to 4 can be simply stated, the differences between them are so fundamental that they lead to radically different ways of thinking about the nature of consciousness and its relationship to the brain and surrounding world—with associated consequences for how one makes sense of first-person versus third-person knowledge, public versus private events, subjectivity versus objectivity , the relation of the phenomenal world to the world described by modern physics, the scope and limits of a science of consciousness and much else (see Velmans, 2000). These differences are so extensive that they amount to different paradigms or worldviews, much of which cannot be covered in one journal article.

In what follows, therefore, I will focus only on the first steps—where RM most obviously departs from competing theories and on the immediate consequences of heading off in a different direction.[12] To clarify the issues I will also address some challenges to, and misinterpretations of RM that have been published since its first introduction in Velmans (1990) and, where appropriate, I will also contrast the immediate consequences of RM, with those of (currently dominant) physicalism.

**Immediate consequences of the reflexive model of perception**

In terms of their *phenomenology* the "physical world", the "phenomenal world", the "world as experienced", and our "experiences of the world" are one and the same—which, according to RM, supports a reflexive model of perception.[13] This does however raise three immediate questions:

1. Given that the proximal neural causes and correlates of experiences are inside the brain, how can one explain the fact that most visually experienced objects and events seem to be outside the brain?
2. Are these experienced objects and events really where they seem to be?
3. What is the ontological status of the phenomenal world?

**How can one explain that some experiences seem to be outside the brain?**

From the contemporary literature, let us consider three competing ways of making sense of the seemingly external, three dimensional nature of the visual world: "transparency" theory, "biological naturalism", and reflexive monism.[14]

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[12] I also focus only on vision. For a treatment of other sense modalities, see Velmans (2000) chapter 7.

[13] This does not mean, of course, that these terms have exactly the same *meaning* in all contexts. The term "physical world" for example is ambiguous: in everyday life we commonly use the term to describe the world as perceived, but in science, the term usually refers to the world as described by physics (e.g. quantum mechanics, relativity theory etc.), which may differ in major ways from the world as normally perceived. The "world as experienced" also has a different emphasis to "experiences of the world" in that these phrases focus our attention in different ways. The first phrase places what is *observed* in the foreground, which, in the reflexive model, is the initiating stimulus. If we are interested primarily in what is going on in the world, this is appropriate. The second phrase draws our attention to the results of perceptual processing in the *observer*, that is, to the resulting experience. If we are interested primarily in what is going on for the subject, this is appropriate. But this does not alter the fact that when we look at an object in the world, we experience only an object in the world, whichever way that experience is conceived.

[14] I have chosen these three for the reason that the contrasts between them highlight the basic options and their consequences in a relatively clear way. The current intellectual landscape is however somewhat more complicated. "Biological naturalism" could be thought of as a broad heading to describe all theories that view conscious experiences as brain states (see for example Searle, 2007), but this term is used here in the narrower sense adopted by Lehar (2003) to describe a group of theories that deal specifically with the issue

**Transparency Theory**

According to Tye (1995, 2007) perceptual experiences are *transparent* and visual perception is rather like peering through a pane of glass:

"Suppose that you have just entered a friend's country house for the first time and you are standing in the living room, looking out at a courtyard filled with flowers. It seems to you that the room is open, that you can walk straight out into the courtyard. You try to do so and, alas, you bang hard into a sheet of glass, which extends from ceiling to floor and separates the courtyard from the room. You bang into the glass because you do not see it. You are not aware of it; nor are you aware of any of its qualities. No matter how hard you peer, you cannot discern the glass. It is transparent to you. You see right through it to the flowers beyond. You are aware of the flowers, not by being aware of the glass, but by being aware of the facing surfaces of the flowers. And in being aware of these surfaces, you are also aware of a myriad of qualities that seem to you to belong to these surfaces. You may not be able to name or describe these qualities but they look to you to qualify the surfaces. You experience them as being qualities of the surfaces. None of the qualities of which you are directly aware in seeing the various surfaces look to you to be qualities of your experience. You do not experience any of these qualities as qualities of your experience. For example, if redness is one of the qualities and roundness another, you do not experience your experience as red or round. …..

Visual experiences, according to many philosophers, are like such sheets of glass. Peer as hard as you like via introspection, focus your attention in any way you please, and you will only come across surfaces, volumes, films, and their apparent qualities. Visual experiences thus are transparent to their subjects (Moore 1922). We are not introspectively aware of our visual experiences any more than we are perceptually aware of transparent sheets of glass. If we try to focus on our experiences, we see right through them to the world outside. By being aware of the qualities apparently possessed by surfaces, volumes, etc., we become aware that we are undergoing visual experiences. But we are not aware of the experiences themselves. " (Tye, 2007, p30)

Tye rightly notes that, in normal perception, we feel that we experience the world, and that it doesn't really make sense to say that one "experience one's experiences". We *have* experiences or, to use Tye's words, we undergo them, but "experiencing one's experiences" does seem to involve an unnecessary (and non-existent) regression.

There are nevertheless two obvious problems with this analysis:

Tye is a physicalist and adopts the view that experiences are nothing more than representations in the brain that are "transparent". Consequently, on his account, when we "introspect" our experiences, we "see right through" perceptual representations in the brain to see the colours, smells and other qualities that actually exist in the world. While this has a certain force as a metaphor, it is difficult to see how this translates into a viable theory. How can one "see right

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under consideration (see also Revonsuo, 2006, and Gray, 2004). "Reflexive monism" is a broad position with many consequences (alongside "dualism", "physicalism" and so on), however on the issue under discussion it can be viewed as a form of "projectivism" (see for example Boghossian & Velleman, 1989, Wright 2003); it could also be classified as a form of "radical externalism" (a term recently introduced by Honderich, 2006). "Enactive" theories of the mind can also be said to be "externalist". However such theories deal largely with the distributed nature of the causes of perception, rather than the external nature of the resulting conscious phenomenology (see discussion in Velmans, 2007a).

through" one's brain states? Who is it that does the peering? For dualists that "someone" would presumably be a disembodied mind. But for physicalists that "someone" would itself have to be a state of the brain that somehow sees through some other state of the brain. Either way, this sounds suspiciously like an added, inner perceiver (or homunculus)—a suggestion that is routinely dismissed in scientific and philosophical theories of conscious perception (a) on the grounds that there is no evidence for such a homunculus, and (b) on the grounds that even if there were, all the problems of perception would simply regress to the homunculus (so it has little explanatory value).

Tye does not deny that we do have experiences of colour, smell and so on; so, if these are *not* properties or qualities of experience as such (as Tye insists), they must be properties of the world, as there is nothing else left of which they could be properties—a form of "direct realism". Although this view has some currency amongst direct-realist, physicalist philosophers for the reason that they need it to make their version of physicalism work as a theory of consciousness, it is routinely dismissed by scientists.

Why? As van der Heijden et.al (1997) note in their commentary on a similar position adopted by Block, (1995), such a view simply does not take the natural sciences seriously.

"That there are colours in the external world is a naive idea, unsupported by physics, biology, or psychology. Ultimately, it presupposes that the representation (the perceived colour) is represented (as a perceived colour). A perceptual system performs its proper function when it *distinguishes* the relevant things in the outer world. For vision, the information about these relevant things is contained in the structure and composition of the light reflected by the outer world that enters the eyes. For distinguishing the relevant things in the external world, a unique and consistent representation of the corresponding distinctions in the light is all that is required." (Van der Heijden, et al, 1997, p158).

However, according to Block (1997), van der Heijden et.al are "wildly, unbelievably wrong. They say that we should give up the idea that a rose or anything else is ever red. The only redness, they say, is mental redness. But why not hold instead that roses are red .... rejecting colors in the mind? Why not construe talk of red in the mind as a misleading way of expressing the fact that P-conscious states[15]represent the world as being red? And a representation of red need not itself be red (like the occurrences of the word "red" here)." (P165).

Of course Block is right that neural representations of red roses need not themselves be coloured. But few claim that they are. What *is* claimed is that once a normal, human visual system is activated in an appropriate way, a visual experience of a red colour will result, *irrespective* of whether that colour corresponds to a physical property out in the world. Penfield & Rasmussen (1950), for example, demonstrated that direct microelectrode stimulation of the visual system resulted in visual experiences, stimulation of the temporal lobe in auditory experiences, stimulation of the somatosensory system in tactile experiences, and so on. Given that such visual, auditory, and tactile qualia can exist *in the absence of* the external physical properties that they normally represent, it is not easy to see how they can be *reduced* to such physical properties.

[15] P-conscious states are states of phenomenal consciousness, contrasted in Block's analysis with A-conscious states, which provide information access.

Tye nevertheless tries to argue that qualia such as colour do reduce in this way, basing his case partly on how things appear to us, and partly on evidence that perceived qualia really do correspond quite well to properties measured by Physics. As Tye (1995) notes, "Certainly we do not experience colors as perceiver-relative. When, for example, a ripe tomato looks red to me, I experience redness all over the facing surface of the tomato. Each perceptible part of the surface looks red to me. None of these parts, in looking red look to me to have a perceiver-relative property. I do not experience any part of the surface as producing a certain sort of response in me or anyone else. On the contrary, I surely experience redness as intrinsic to it, just as I experience the shape of the surface as intrinsic to it." (p145). Given that we experience such colours as not being perceiver-relative, he regards the view that they *are* perceiver-relative as "just not credible" (p145).

Given that physicalism routinely denies the reliability of appearances as a guide to what experiences are really like[16], Tye rests his case on shaky ground. There are many obvious counterexamples. The colours of surfaces may seem to be observer-independent, but the colours of after-images do not. For example, if one stares at a red spot for a few minutes, one will experience a green after-image that projects onto any surface that the eye fixates. The apparent size of the after-image also increases as the judged distance of the surface increases. So, if apparent, observer-dependence is to be the criterion of what is "mental", after-images are surely mental. The observer-dependence of colour attached to surfaces in the world also becomes evident once the visual system no longer functions in a normal way. In cases of red-green colour blindness, for example, red can no longer be distinguished from green—and in cases of achromatopsia the entire world appears in shades of grey! More fundamentally, the reason that surfaces just appear coloured (without any conscious contribution on our part) is due to the fact that visual processing operates *preconsciously*. That is, once structured visual scenes appear in conscious experience, the binding of colour with shape, movement and so on has already taken place (Zeki, 2007). Finally, it is important to note that variations in *how* things are experienced cannot be used to decide *whether or not* things are aspects of experience!

Tye's second main argument relies on evidence that in some circumstances the qualia – physical property correspondence may be relatively invariant. Colours remain fairly similar for example when viewed outdoors, indoors (illuminated by incandescent lamps), or through sunglasses. Tye asks, "Why should this be? Surely the most straightforward answer is that the human visual system has, as one of its functions, to detect the real, objective colors of surfaces. Somehow, the visual system manages to ascertain what colors objects really have, even though the only information immediately available to it concerns wavelengths." (p146) After a review of some of the relevant evidence, Tye concludes that

"Colors are objective, physical features of objects and surfaces. Our visual systems have evolved to detect a range of these features, but those to which we are particularly sensitive are indirectly dependent on facts about us. In particular there are three types of receptor in the retina, each of which responds to a particular waveband of light, and the spectral reflectances of surfaces at those wavebands (that is, their disposition to reflect a certain percentage of incident light within each of the three bands) together determine the colors we see. So the colors themselves may be identified

[16] For example, physicalism routinely claims that conscious qualia, *contra* appearances, are just states of the brain.

with ordered triples of spectral reflectances. An account of the same general sort may be given for smells, tastes, sounds, and so on." (Tye, 1995, p150)

Tye is right to point out that the way perceived colour maps onto given patterns of light reflectance may be more invariant than is sometimes thought. After all, it makes evolutionary sense for our perceptual systems to pick out physical invariances when they occur and to translate these into relatively invariant experiences. However even a *perfect correlation* between perceived qualia and events described by Physics would not establish their ontological identity.[17] Indeed, Physical descriptions as such do nothing to explain why one pattern of light reflectances should be perceived as "red," and another as "green," while a pattern of light reflectances in the ultra-violet region is seen as nothing at all (unless one happens to be a bee). Nor do physical descriptions explain the rather arbitrary way the visual system translates electromagnetic energies with wavelengths ordered on a *ratio scale* into colour categories ordered on a *nominal scale*.[18] If our experiences simply "mirrored" the world, we would expect the relationships between properties described by Physics to be more faithfully preserved in the way such relationships are experienced. To this one must add the many differences in the way given physical properties can be experienced both within and between species (see Velmans, 2000, chapter 7 for a review). As van der Heijden et al (1997) note, the view that perceived qualia exist in the world in a way that is free of such biological influences simply does not take the natural sciences seriously.

**Biological Naturalism versus Reflexive Monism**

Although Biological Naturalism (BN) and Reflexive Monism (RM) offer very different ways of understanding the relationship of consciousness to the brain and physical world, they share many background assumptions and explanatory features. Consequently, to sharpen the issues in contention, I will discuss them in tandem.

Unlike transparency theorists who view colour, spatial extension and so on as observer-independent properties of the *world,* BN and RM both accept that *experiences themselves* have qualities. These qualities usually *represent* aspects of the world in useful ways developed over the course of biological evolution, but are not necessarily qualities of the *world itself*. Rather, if we take seriously the many alternative representations of the world offered by physics and other sciences, our everyday experiences must only be rough and ready representations of what is really going on[19] —a standard

[17] Causation, correlation, and ontological identity are very different relationships. If A is identical to B, then B is identical to A (symmetry) and all the properties of A are the same as all the properties of B (identity obeys Leibniz's Law). Correlation is also symmetrical (if A correlates with B, then B correlates with A) but it does *not* obey Leibniz's Law, for example height correlates with weight in humans but all the properties of height are not the same as all the properties of weight. Causation is neither symmetrical nor does it obey Leibniz's Law. Similar caveats apply to the relation of conscious experiences to their neural correlates in the brain—see Velmans (1998a, 2000 chapter 3), and discussion below.

[18] Wavelengths of 700 nm are longer than wavelengths of 400 nm (by a ratio of 7/4). However, while red is different from violet it is not "longer" than it!

[19] To be more precise, while human perceptual representations are normally useful, they are species specific, approximate, and incomplete. Being representations, they can also, at times, be misrepresentations of what is really going on (in cases of misperception, illusion, hallucination and so on). For a detailed analysis of how the dimensions of experience relate to the dimensions of the physical world as measured by physical instruments, see Velmans, 2000, chapter 7.

view in science variously known as “indirect realism” or “critical realism”, with a lineage dating back to Newton, Galileo, and Locke.

In short, both BN and RM adopt a form of *appearance-reality* distinction which accepts that the appearances of the world only indirectly represent (and sometimes misrepresent) the nature of the world itself. For the purposes of the following discussion I will call this “the world appearance-reality distinction”.

In the form defended by Lehar (2003), and Revonsuo (1995, 2006), BN, like RM also accepts that spatial extension is fundamental to visual experience, and that the three-dimensional phenomenal world *appears* to be outside the brain. However, BN is a form of physicalism. Consequently, unlike RM, Lehar and Revonsuo also insist that this three-dimensional phenomenal world can be nothing more than a brain state that must be inside the brain. To reconcile this difference between how the phenomenal world *appears* and how it *really is*, they suggest that the visual phenomenal world is in fact a form of virtual reality. One’s experienced body with its surrounding experienced world is part of this virtual reality—and, despite appearances, this entire virtual world really only exists inside one’s brain.[20]

In claiming conscious experiences that seem to be outside the brain to be nothing more than brain states located in the brain, BN therefore goes on to adopt a *second* appearance-reality distinction applied not to the contrast between the appearances and nature of the *world*, but to the appearances and nature of the *appearances themselves.* Let us call this “the appearance appearance-reality distinction”.

It is on this issue that BN and RM part company. RM accepts the world appearance-reality distinction, but, rejects the appearance appearance-reality distinction. According to RM conscious appearances really are (roughly) how they seem to be.[21]

The appearance appearance-reality distinction is, of course, entirely congenial to those reductionist and eliminativist philosophers who wish to question the nature or even the existence of conscious appearances. However, BN (like RM) claims to be a *nonreductionist* theory, which raises the tricky issue of how one can both argue that conscious appearances are really very different to how they appear to be, *and* that one is being nonreductive about conscious appearances.

John Searle, for example, was one of the first to grapple this issue. As he noted,

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[20] Virtual reality provides a useful metaphor for visual experience that is also exploited by Reflexive Monism (Velmans, 1993b, 1998b, 2000 chapter 6) as we will see below.

[21] I stress once again that in rejecting the appearance appearance-reality distinction, RM is committed to a form of realism about appearances, but not to naïve realism about appearances--and I have added the qualifier “roughly” to take account of the fact that our descriptions and understanding of our own phenomenology are revisable depending on many factors: how we attend to that phenomenology, what descriptive systems or measurement systems are available and so on. Consequently our beliefs about our conscious experiences are revisable, but they are not, under normal circumstances, *completely wrong*. We might for example erroneously believe that we would *always* notice major changes in the areas of the visual field to which we attend, although experiments on change blindness show this to be false. On the other hand, we are not usually wrong about our ability to *see* (unless we suffer from anosagnosia) or, in ordinary circumstances, about *what* we can see, hear, feel, and so on (unless there is clear evidence to the contrary). There are extensive areas of psychological research (perception, attention, psychophysics, etc.) devoted to the study of such issues, and RM adopts a form of *critical phenomenology* that is typical in such research - see extensive discussion in Velmans, 2007b).

"Common sense tells us that our pains are located in physical space within our bodies, that for example, a pain in the foot is literally in the physical space of the foot. But we now know that is false. The brain forms a body image, and pains like all bodily sensations, are parts of the body image. The pain in the foot is literally in the physical space in the brain." (Searle 1992, p63)

At the same time, Searle wishes to defend the reality of conscious appearances. Indeed, later in the same book, he concludes that

"...consciousness consists in the appearances themselves. *Where appearance is concerned we cannot make the appearance-reality distinction because the appearance is the reality*." (Searle 1992, p121—my italics).

Lehar (2003, 2006) develops the same point. He does not deny that the phenomenal world *appears* to be out-there in space. On the contrary, "The inescapable conclusion is that visual experience is spatially structured. To deny the spatial aspect of experience is to deny the single most characteristic property of that experience, or what makes visual experience what it is." (Lehar, 2006). Nor does he have any doubt that such experiences are real.[22] On the contrary, "the eliminative hypothesis turns epistemology *on its head* and asks us to doubt the existence of the one and only thing that we can be absolutely certain to exist, and that is our own experience. … Even in the case of dreams and hallucinations, I can be absolutely certain that I am having an experience, and *I can be absolutely certain that that experience has the properties I experience it to have. To claim that conscious experience is any different than it is experienced to be, is a contradiction in terms!* (Lehar, 2006—my italics)

This illustrates the acute problem that apparent, external spatial location poses for biological naturalism: If biological naturalism is true, experiences are states of the brain, which are necessarily in the brain. However, if "the appearance is the reality", and if "I can be absolutely certain that experience has the properties that I experience it to have", then if the pain appears to be in the foot, it really is in the foot, and if the phenomenal world appears to be out there beyond the body surface then it really is out there beyond the body surface.[23] Either biological naturalism is true, or the appearance is the reality. One can't have both.

Let us weigh the alternatives. Has science discovered that (despite appearances) pains really are in the brain as Searle suggests? It is true of course that science has discovered *representations* of the body in the brain, for example, a tactile mapping of the body surface distributed over the somatosensory cortex (SSC). However, no scientist has observed actual body sensations to be in the brain, and no scientist ever will, for the simple reason that, viewed from an external observer's perspective, the body *as experienced by the subject* cannot be observed; one cannot *directly* observe another person's experience—and, given the importance of this issue to BN, we return to it below.

[22] Lehar would claim to be a "nonreductive physicalist", but is nevertheless reductive in the sense that he insists that, *contra* appearances, conscious experiences are nothing more than brain states. However he is not an eliminativist for the reason that he believes that these conscious brain states are real.

[23] Strictly speaking, of course, what we normally think of a "the foot" is actually the experienced (phenomenal) foot, and what we think of as "the body surface" is, likewise, the experienced (phenomenal) body surface. One might argue therefore that relations such as a pain being "in" a foot, or the extemal world being "beyond" the body surface only obtain *within* this world of appearances. I will return to this issue in the discussion of how phenomenal space relates to physical space below (see e.g. Note 27).

Science has nevertheless investigated the *relationship* of the body image (in SSC) to tactile experiences. Penfield & Rassmussen (1950), for example, exposed areas of cortex as they prepared to remove cortical lesions that were responsible for focal epilepsy. To avoid surgical damage to areas essential to normal functioning, they first explored the functions of these areas by lightly stimulating them with a microelectrode and noting the subject's consequent experiences. As expected, stimulation of the somatosensory cortex produced reports of tactile experiences. However, these feelings of numbness, tingling and so on were subjectively located *in different regions of the body, not in the brain*. In sum, science has discovered that neural excitation of somatosensory cortex *causes* tactile sensations, which are subjectively located in different regions of the body. Rather than being scientific evidence for BN, this effect is precisely the "perceptual projection" that the reflexive model describes![24]

**What is perceptual projection?**

The reflexive model of perception in Figure 3 shows, in schematic form, how reflexive monism works in human visual perception. As will be evident from the arrows at the top of Figure 3 leading from the subject's brain to the perceived cat, the reflexive model posits a form of *perceptual projection* that completes the reflexive process. It is however important to be clear about what is meant by "perceptual projection" in order to convey it's precise role in the model. Crucially, perceptual projection refers to *an empirically observable effect*, for example, to the fact that this print seems to be out here on this page and not in your brain. In short, perceptual projection is an effect that requires explanation; perceptual projection is not itself an explanation. We know that preconscious processes within the brain, interacting with events in the external world, produce consciously experienced events, which may be subjectively located and extended in the phenomenal space beyond the brain, but we don't really know how this is done. We also know that this effect is

[24] Given that direct cortical somatosensory stimulation bypasses normal sensory input channels, this projective effect is a surprising empirical finding, and consequently a valid empirical test of BN versus RM on this point. If the apparent external location of many experiences is a kind of illusion or hallucination as BN suggests (see later discussion), it might be possible, under suitable experimental conditions, to experience such phenomena as they really are and the findings could have turned out differently. For example, in a study of "inside-the-head-locatedness" Laws (1972) investigated the acoustic differences between white noise presented through headphones, which is perceived to be *inside the head*, and white noise presented through a speaker at a distance of 3 metres, which is perceived to be out in the world, using probe microphones positioned at the entrance to the auditory canals. This revealed spectral differences produced largely by the pinnae of the ears, between the white noise presented either through the speaker or through the headphones. Ingeniously, Laws then constructed an electrical "equalising" circuit to simulate these spectral differences and inserted this into the headphone circuit. With the headphones "unequalised", white noise appeared to be inside the head irrespective of loudness, as before. With the headphones "equalised", the white noise not only appeared to be outside the head but also appeared to become more distant as its loudness decreased! Being an empirically based theory, RM fully accepts that the location of the experienced sound in such experiments can be either "inside the head" or "out in the world", depending on the state of the headphones and how the acoustic cues that they provide are interpreted by the auditory system. By contrast, BN either has to accept that some experiences are outside the brain, which is inconsistent with them being nothing more than brain states, or it has to insist that experienced sounds (and all other experienced phenomena) are really in the brain *whatever the phenomenal evidence*—making this aspect of BN unfalsifiable.

subjective, psychological, and viewable only from a first-person perspective. Nothing physical is projected from the brain.[25]

That perceptual projection viewed as a *psychological effect* may be both real and scientifically investigable will come as no surprise to experimental psychologists. But it has sometimes been seriously misunderstood and misrepresented by those who wish to argue for competing positions. Lehar (2003, 2006) for example, does not deny that the phenomenal world appears to be out-there in space, and, unlike eliminative materialists, he has no doubt that such experiences are real. On the contrary, "*I can be absolutely certain that that experience has the properties I experience it to have. To claim that conscious experience is any different than it is experienced to be, is a contradiction in terms!*" (See quote above.) At the same time, his commitment to the view that experiences are really in the brain, requires him to attack perceptual projection on the grounds that,

"the only thing that is projected is conscious experience, a subjective quality that is undetectable externally by scientific means. But … the problem with this notion is that the sense-data that are experienced to exist do not exist in any true physical sense, and therefore the projected entity in Velmans' theory is a spiritual entity to be believed in (for those who are so inclined) rather than anything knowable by, or demonstrable to, science."(Lehar 2003) And later, in his 2006 Tucson address, he goes on to assert that "It is a theory which cannot be falsified, because its prediction, that nothing will be detected, is identical to the null prediction, that nothing is projected. Therefore it is not a scientific hypothesis about how spatial experience arises from the brain, but rather, it is a theory that banishes the most interesting and challenging part of that problem into a spirit world of ghostly structures that have no mass, occupy no space, consume no energy, and have no physical presence in the world known to science." (Lehar 2006)

**The scientific status of perceptual projection**

This is truly confused. Within RM, phenomena that are experienced to be in the external, phenomenal world are one variety of "conscious experience"—and I have never claimed such consciously experienced phenomena to be spiritual entities that are unknowable by or demonstrable to science. On the contrary, I have argued that such phenomena form the very basis of empirical science (see Velmans, 2000, chapter 8, Velmans, 2007c, and the further discussion of the ontology of conscious experiences below). I have also made it perfectly clear that "perceptual projection" in RM is *not* a hypothesis or theory about how experience arises from the brain. Rather, "perceptual projection is a *psychological effect* produced by unconscious perceptual processing" (Velmans, 2000, p 115)—a point I have repeated in direct exchanges with Lehar, for example in my commentary on his 2003 target article (see Velmans, 2003b).[26]

This distinction between effects and theories that attempt to explain them is important. One cannot *falsify* effects (demonstrate them to be false). They are either observed to occur or not. And in this

[25] Unlike Empedocles, I am *not* suggesting that there are rays emitted from the eyes that light up the world. However, contrary to what Van de Laar (2003) suggests, the fact that perceptual projection is not "physical" in this sense, does not make it just "metaphorical." Psychological effects are real and investigable by science, not metaphorical.

[26] Like Lehar, much of Van de Laar's (2003) commentary on perceptual projection also confuses perceptual projection viewed as a psychological effect with a theory of how that effect is brought about.

case, the effect is ubiquitous. The evidence for it is all around us (in every phenomenon perceived to be in the external world). Ironically, Lehar and I are in complete agreement on this point. As he notes, "To deny the spatial aspect of experience is to deny the single most characteristic property of that experience, or what makes visual experience what it is." (See quote above.)

How can one investigate this effect scientifically? There is convincing evidence that the experience of depth is, in part, a construction of the mind/brain, for example in cases of depth perception arising from cues arranged on two-dimensional surfaces in stereoscopic pictures, 3D cinemas, holograms, and virtual realities—and I have reviewed scientific evidence for perceptual projection in various other sense modalities in Velmans (1990, 2000 chapter 6). Underlying processes such as the perception of distance and location in space are standard topics in the psychology of perception that one can find in any introductory psychology textbook. One can study the cues, or information in the light that contribute to depth perception (Hershenson, 1998), one can study the neural structures that support it (e.g. Milner and Goodale, 1995; Goodale, 2007) and one can study the various instances where depth perception breaks down (Robertson, 2004). One can also study how the judged metrics of phenomenal space relate to physical measurements of space (e.g. Lehar, 2003) and how both of these relate to neural state space. Given that neural state space is (by definition) in the brain, and that phenomenal state space is (according to RM) mostly outside the brain, an understanding of how neural state space relates to phenomenal state space would also provide a *topology* of perceptual projection.

In short, accepting "perceptual projection" as a ubiquitous, but poorly understood perceptual effect does not place it beyond science. Rather, it draws attention to the need to investigate it more deeply. Accepting that the phenomenal world is *part of* conscious experience also encourages an expanded study of how perceptual processes in the brain combine to support such an integrated, three-dimensional experience (a point on which RM and BN fully agree). A fuller understanding of perceptual projection also offers a more unified understanding of a wide range of phenomena experienced to have both location and extension, including phenomena as diverse as lucid dreams, hallucinations, eidetic imagery, the creation of virtual realities, the construction of a body image, and the normal perception of events in three-dimensional space. Accepting perceptual projection as a normal effect (when perceptual processes form representations of events in the world) also makes it easier to understand what happens in pathological or artificial situations. For example, hallucinations can be understood to result from mental models that erroneously project information that has an internal rather than an external origin (consequent on a breakdown of the usually reliable modelling of internal versus external events). And three-dimensional virtual worlds can be understood to arise from artificial stimulation of the same projective processes that create normal, phenomenal worlds.

There is however an important caveat. While such all studies all contribute to our understanding of space perception, including perceptual projection viewed as a psychological effect, they do not fully *explain* how proximal neural causes within the brain support visually experienced events that seem to be outside the brain. For this, we require an added explanatory model—and no adequate explanatory model currently exists.[27] [28] Holograms and virtual realities nevertheless provide tempting analogies.[29]

[27] Transparency theory is not viable as an explanatory model for the reasons discussed above, while biological naturalism simply tries to explain the effect away by denying that perceptual projection is a real effect. But viewing perceptual projection as an illusion does nothing to explain how that illusion comes about. If the entire

Let us suppose, for example, that the information encoded in the subject's brain is formed into a kind of neural "projection hologram." A projection hologram has the interesting property that the three-dimensional image it encodes is perceived to be out in space, in *front* of its two-dimensional surface, provided that it is viewed from an appropriate (frontal) perspective and it is illuminated by an appropriate (frontal) source of light. Viewed from any other perspective (from the side or from behind) the only information one can detect about the object is in the complex interference patterns encoded on the holographic plate. In analogous fashion, the information in the neural "projection hologram" is displayed *as* a visual, three-dimensional object out in space only when it is viewed from the appropriate, first-person perspective of the perceiving subject. And this happens only when the necessary and sufficient conditions for consciousness are satisfied (when there is 'illumination by an appropriate source of light'). Viewed from any other third-person perspective the information in S's 'hologram' appears to be nothing more than neural representations in the brain (interference patterns on the plate).

The projection hologram is, of course, *only* an analogy but it is useful in that it shares some of the apparently puzzling features of conscious experiences. Viewed from an external observer's perspective, the *information* displayed in the three-dimensional holographic image is encoded in two-dimensional patterns on a plate, but there is *no* sense in which the subject's three-dimensional image is *itself* "in the plate". Likewise, according to RM (and contra BN) there is no sense in which the phenomenal cat observed by S is "in her head or brain." In fact, the 3D holographic image *does not even exist* (as an image) without an appropriately placed observer and an appropriate source of light. Likewise, the existence of the phenomenal cat requires the participation of S, the experiencing agent, and all the conditions required for conscious experience (in her mind/brain) have to be satisfied. Finally, a given holographic image only exists *for* a given observer, and can only be said to be located and extended where that observer *perceives* it to be. S's phenomenal cat is similarly private and subjective. It can only be said to be out in phenomenal space beyond the body surface to the extent that she perceives it to be out in space beyond the body surface. In this sense, phenomenal location is *observer-relative*, an issue to which we return below.

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phenomenal world (including both one's experienced skull and its visually experienced surround) is part of a virtual reality that is literally located inside the real skull and brain, then experiences might not actually be outside the brain. However that does not alter the way that they *seem* to be—and this manoeuvre gets one no closer to explaining why things seem to be the way that they do. While BN rightly makes the point that what we normally think of as the "skull" is just a virtual skull (a skull as experienced), not to be confused with the real one, the virtual external world still appears to be outside the virtual skull. So within BN the problem of out-thereness simply regresses to relationships *within* the virtual model (to relationships between the virtual skull and virtual surrounding world, supposedly located inside the brain).

[28] The absence of an adequate explanatory model for how neural causes and correlates inside the brain support conscious experiences outside the brain does not rule out the possibility of such a model any more than the current absence of adequate models rules out their possibility in other areas of science. Nor is a spatial separation of neural cause from experienced effect an impediment to theory development. The existence of non-local connectedness is not peculiar to brain states and projected experiences. Physics for example accepts that there are various forms of non-local causation, such as gravity, non-locality in quantum mechanics, and electromagnetism (for example in the way electrical current in a wire produces a magnetic field outside the wire).

[29] Holography was first proposed as a model of neural organisation and space perception by Pribram (1971, 1974, 1979) and has been developed further by Pribram (2004). Virtual reality as an explanatory model for the spatial nature of visual experience has been extensively developed by Revonsuo (1995, 2006)—see also Velmans (1993b, 1998b, 2000 chapter 6).

While virtual realities do not completely explain perceptual projection either, they provide added ways of studying its operation. In virtual reality one *appears* to interact with a virtual world outside one's body although there is no *actual* (corresponding) world there. So, in this situation, there is no danger of confusing the appearance of the virtual world with an actual world that one sees. Yet, objects in a VR world appear to have 3D location and extension. Virtual objects can also be given what appear to be classical "physical" properties such as "hardness"; for example, the observer may wear a gauntlet on her hand which is programmed to resist closing around a visually perceived, virtual object, making the latter feel "solid." In truth, however, there is nothing solid there.

Such virtual appearances do not fit easily into either a dualist or reductionist understanding of consciousness (see Velmans, 1998b). And contra BN, in spite of being nothing more than *seemings*, they do not seem to be "in the head or brain". But they fit naturally into the reflexive model. When visual input from screens in VR headsets are appropriately co-ordinated with head and body movements, they provide information which resembles that arriving from actual objects in the world. The mind/brain models this information in the normal way, and constructs what it normally constructs when it receives such input—a perceived, phenomenal world located and extended in the three-dimensional space beyond the body surface!

It should be apparent from the above that scientific investigations of the spatial nature of perception can inform both BN and RM equally, as they both accept that visual perception has spatial characteristics. I would argue that available analogies such as holograms and virtual realities apply more naturally to RM than they do to BN for the reasons mentioned above.[30] Nevertheless, judged on these grounds alone, there is little to separate the theories. Let us turn, therefore, to the real issues that divide them.

**Critical differences between biological naturalism and reflexive monism**

Driven by its physicalist philosophy, BN is forced to argue that conscious appearances are really nothing more than brain states that are, by definition, in the brain. On this view not only are conscious appearances not what they appear to be, but they are also not where they appear to be. Given that defenders of BN also wish to claim that "where appearance is concerned we cannot make the appearance-reality distinction because the appearance is the reality" (Searle) and that "I can be absolutely certain that that experience has the properties I experience it to have" (Lehar), this produces a serious internal inconsistency, as we have seen. Either the appearance-reality distinction applies to conscious appearances, or it doesn't. One can't have both. The insistence that the apparent location of experiences has no bearing on their actual location also makes this aspect of BN unfalsifiable.

In contrast, I suggest that RM is an internally consistent, "commonsense" position that closely follows the contours of everyday experience, which accepts that conscious appearances really are (roughly) how they seem. It is consistently realist about experiences without being naïvely realist about experiences. RM also fully accepts the findings of science regarding the evidence for perceptual projection and its causes, along with the evidence for other neural causes and correlates

[30] Pribram (2004), who was the first to develop a holographic model of brain functioning, takes the same view, explicitly linking the consequences of his holographic model to reflexive monism as developed in Velmans (2000).

of conscious experience in the brain. In sum, RM understanding of conscious phenomenology conforms closely to *all* the first- and third- person evidence, giving it greater "ecological validity" than BN which requires one to discount those aspects of the first person evidence that relate to apparent spatial location and extension.[31] Perhaps, given the current physicalist zeitgeist, these differences between BN and RM are not decisive. However, these differences have some further, surprising consequences—and it is in terms of these consequences that the theories can be judged.

**Is the phenomenal world inside the brain?**

Like RM, BN (as developed by Lehar, Revonsuo, and Gray) takes it as self-evident that the 3D phenomenal world extends to one's perceptual horizons and the perceived dome of the sky. However unlike RM, BN claims that this entire phenomenal world is just a virtual reality located inside the brain. This leads to a surprising conclusion. As Lehar (2003) rightly points out, if the phenomenal world is inside the brain, the real skull must be *outside* the phenomenal world (the former and the latter are logically equivalent).

Let me be clear: if one accepts that

a) The phenomenal world extends to the experienced horizon and dome of the sky.

b) The phenomenal world is literally inside the brain.

It follows that

c) The real skull (as opposed to the phenomenal skull) is beyond the experienced horizon and dome of the sky.

While Lehar (2003), Revonsuo (2006) and Gray (2004) accept that this conclusion is entailed by a) combined with b), Lehar admits that this consequence of biological naturalism is "incredible".

Note that the difference between RM and BN on this issue also has very different consequences for how one thinks about the nature of the real skull and brain. RM adopts critical realism—the conventional view that, although our experiences do not give us a full representation of how things really are, they normally provide useful approximations. As a first approximation, brains are what one finds inside the skulls that we feel sitting on the top of our necks, that one can find pictures of in neurophysiological textbooks, and that are occasionally to be seen pickled in jars. Although I accept that these "skulls" and "brains" are really phenomenal or experienced skulls and brains, these mental models are roughly accurate. Consequently, the location and extension of the phenomenal and real skull and brain closely correspond.

Lehar also accepts that phenomenal skulls and brains are mental models of real ones, but BN forces him to claim that the real skull is beyond the experienced dome of the sky. If so, our assumption that the real brain is more or less where it seems to be (inside the experienced skull) must be a delusion. The alternative is that the BN account of conscious phenomenology is wrong. Not only is the notion of a skull beyond the experienced universe unfalsifiable (it would always be beyond any phenomena that one could actually experience), but it is also hard to know in what sense something

[31] "Ecological validity" is a standard test of a psychological theory that assesses how well it applies to real life situations.

that *surrounds* the experienced universe could, in any ordinary sense, be a "skull" (it certainly isn't the skull that we can feel on top of our necks). Nor is it easy to grasp in what sense something that *contains* the experienced universe is a "brain" (it certainly isn't the brain that one can perceive inside the skulls on top of our necks).[32] [33]

In my view, this casts an entirely different light on the so-called 'scientific' status of biological naturalism and the so-called 'unscientific' claims of the reflexive model. Put your hands on your head. Is that the real skull that you feel, located more or less where it seems to be? If that makes sense, the reflexive model makes sense. Or is that just a phenomenal skull inside your brain, with your real skull beyond the dome of the sky? If the latter seems absurd, biological naturalism is absurd. Choose for yourself.

**Is the phenomenal world really where it seems to be?**

To understand how experienced objects and events might really be (roughly) where they are experienced to be, we have to look more closely at the way that phenomenal space relates to "real" space. No one doubts that physical bodies can have real extension and location in space. Dualists

[32] In a spirited defence of BN, an anonymous reviewer (AR) of the first draft of this paper responded to this critique in the following way: "that it is in principle impossible to empirically discover that a person's experiences are located in the brain (or conversely that the skull and the physical world are located outside the experiential world) ... is an interesting claim, because it issues predictions about the ultimate limits and the future discoveries of neuroscience. Thus, if neuroscience one day, against the predictions by Velmans and others, will produce functional neuroimaging that reveals the spatial structure and the experiential content of consciousness, and all the data collected by the imaging instrument originates inside the brain, then RM will be empirically falsified. If this kind of imaging experiment can never be done successfully, no matter how perfectly the brain can be imaged, then BN is empirically falsified. Thus, Velmans is wrong about these issues being beyond empirical falsification." (personal communication). But there are serious problems with this argument. To begin with—a technical point: while on can in principle verify existence statements such as "conscious experiences exist inside the brain", one cannot falsify them, for the reason that one can always claim that one has not looked hard, well, or long enough. Causal laws can be falsified, at least in principle, because they are universal statements that exclude exceptions. Consequently any observation that is inconsistent with the law is potentially falsifying (although science in practice operates in a far more complex fashion). More importantly, this defence of BN confounds "functional neuroimaging that reveals the spatial structure and the experiential content of consciousness" with functional neuroimaging that reveals conscious experiences themselves—which simply finesses the classical problem of "other minds." As it happens, RM fully accepts that neuroscience can (and probably will) uncover the neural encodings of spatial structure and other experiential content of consciousness. But these are features of the *neural correlates of consciousness*, not the phenomenal features of the experiences themselves (a detailed account of how these relate is given in the section on "How the phenomenal world relates to processing in the mind/brain" below). AR nevertheless, firmly ties his colours to the mast, when he goes on to argue that "BN claims that if we really do get our measuring instruments in touch with the brain mechanisms of consciousness, we will find neural states that look exactly the same as the experiences themselves, because they constitute those experiences." Experienced readers will recognise the problems with this 'picture in the brain' theory. The neural evidence simply does not support it. The notion that neural states might look the same as the experiences themselves, and (presumably), sound, smell, and feel the same as the experiences themselves just does not correspond to the world in which we live, and it is routinely dismissed within both philosophy and science (for example both Block and Van der Heiden dismiss it, in spite of their other disagreements discussed above). Consequently, if BN were open to falsification by evidence that brain states do not look, sound, smell or feel like their accompanying experiences, BN would already be falsified.

[33] Note that RM also postulates a global 'envelope' that contains the experienced universe. However, within RM, reflexive observer-observed interactions and their consequent experiences all take place within the psychophysical *universe itself*, rather than in some "real skull" beyond the dome of the experienced sky.

and reductionists nevertheless find it hard to accept that experiences can have a real, as opposed to a 'seeming' location and extension. They do not doubt, for example, that a physical foot has a real location and extension in space, but, for them, a pain in the foot can't really be in the foot, as they are committed to the view that it is either nowhere or in the brain. For them, location in phenomenal space is not location in real space.

According to reflexive monism however, this ignores the fact that, in everyday life, we take the phenomenal world to *be* the physical world. It also ignores the pivotal role of phenomenal space in forming our very understanding of space, and with it, our understanding of location and extension in measured or "real" space.

What we normally think of as the "physical foot" for example is actually the *phenomenal foot* (the foot as seen, felt and so on). That does not stop us from pointing to it, measuring its location and extension and so on. If so, at least some phenomenal objects can be measured. While a pain in the foot might not be measurable with the same precision, few would doubt that we could specify its rough location and extension (and differentiate it for example from a pain in the back).

What we normally think of as "space" also refers, at least in the initial instance, to the phenomenal space that we experience through which we appear to move. Our intuitive understanding of spatial location and extension, for example, derives in the first instance from the way objects and events appear to be arranged relative to each other in phenomenal space (closer, further, behind, in front, left, right, bigger, smaller and so on). We are also accustomed to making size and distance estimates based on such appearances. This print for example appears to be out here in front of my face, and THIS PRINT appears to be bigger than this print. However, we recognise that these ordinal judgments are only rough and ready ones, so when we wish to establish "real" location, distance, size or some other spatial attribute, we usually resort to some form of *measurement* that quantifies the dimensions of interest using an arbitrary but agreed metric (feet, metres etc), relative to some agreed frame of reference (for example a Euclidian frame of reference with an agreed zero point from which measurement begins). The correspondence or lack of correspondence between phenomenal space and measured space is assessed in the same way, by comparing distance judgments with distance measurements in psychology experiments. For example, I can estimate the distance of this phenomenal print from my nose, but I can also place one end of a measuring tape on the tip of my nose (point zero) and the other end on this print to determine its real distance.

Such comparisons allow one to give a broad specification of how well phenomenal space corresponds to or maps onto measured space. There are of course alternative representations of space suggested by physics (four-dimensional space-time, the 11 dimensional space of string theory, etc) and non-Euclidian geometries (e.g. Riemann geometry). However, a comparison of phenomenal to measured (Euclidian) space is all that we need to decide whether a pain in my foot or this perceived print on this page is, or is not, really in my brain. According to the reflexive model, phenomenal space provides a natural representation, shaped by evolution, of the distance and location of objects viewed from the perspective of the embodied observer, which models real distance and location quite well at close distances, where accuracy is important for effective interaction with the world. My estimate that this page is about 0.5 metres from my nose, for example, is not far off. However, phenomenal appearances and our consequent distance judgments quickly lose accuracy as distances increase. For example, the dome of the night sky provides the

outer boundary of the phenomenal world, but gives a completely misleading representation of distances in stellar space.

Note that, although we can use measuring instruments to correct unaided judgments of apparent distance, size and so on, measuring tapes and related instruments themselves appear to us as phenomenal objects, and *measurement operations appear to us as operations that we are carrying out on phenomenal objects in phenomenal space*. In short, even our understanding of "real" or measured location is underpinned by our experience of phenomenal location. And crucially, whether I make distance judgments about this perceived print and judge it to be around 0.5 metres in front of my face, or measure it to find that it is only 0.42 metres, *does not alter the phenomenon that I am judging or measuring.* The distance of the print that I am judging or measuring is the distance of this perceived print out here on this visible page, and not the distance of some other (non-existent) 'experience of print' in my brain.

**Observer-dependent versus observer-independent existence and location**

There is however a complication. According to RM, in normal veridical perception, experienced phenomena are projected onto objects and events themselves. Consequently, in everyday life, we usually behave as naïve realists, and treat the objects and events we perceive as if they were the objects and events themselves. This produces a potential ambiguity that, in the analysis of phenomenal location and distance above, can lead to confusion.[34] One might accept for example, that when measuring or judging the distance of this print on this page, that one can measure the distance of the *print itself* or *page itself*, while rejecting the suggestion that this amounts to measuring the distance of the *phenomenal* print or page—or that one is, in any sense, measuring the distance of an *experience*.

The *observer-dependence* of experienced phenomena adds a further complication. Insofar as the appearance of phenomena depends on the perceptual-cognitive systems and supplementary observation arrangements employed by an observer, experienced phenomena have an observer-dependent existence. It follows that their phenomenal properties, including their phenomenal location and distance are likewise observer-dependent. By contrast, according to the critical realism that RM adopts, things themselves can exist at a given location whether they are observed or not.[35] Consequently, the apparent location and distance of the phenomenal print is observer-dependent, while the print itself has a location that is, in a sense, observer-independent.[36] Given all this, in what sense can one claim the apparent location and distance of experienced phenomena to be "real"?

[34] For example, on their first introduction to RM, Thomas Nagel and Stevan Harnad wondered whether I had simply confused the *experienced* object (the "intentional object") with the object itself. See discussions following Velmans (1993b) pp 92-93.

[35] I refer here only to macroscopic things such as tables, chairs and cats that can be adequately described (for most purposes) by classical physics, and, for the purposes of this discussion, I will ignore quantum mechanical events where the observer independence of observed events is much in dispute.

[36] As before, we are concerned here only with macroscopic nearby objects (ignoring both quantum mechanics, and relativistic effects). Actual location can of course only be assigned within some standardised measurement system that has an agreed zero point from which measurement begins. So, in this sense, an assigned location cannot be observer-independent even for these objects. However this is tangential to the issue under

Virtual realities provide a convenient way to sort out these relationships for the reason that in VR we can remove the tight linkage of projected, phenomenal objects onto objects themselves. At the time of writing, some of most convincing virtual realities are provided by 3D cinemas that use polarized spectacles to direct different views of a visual scene to the left and right eyes, thereby employing retinal disparity to create the impression of virtual objects distributed in a 3D virtual space. So called "4D" cinemas that mix virtual with real effects are even more convincing. A virtual arrow flying past one's right ear, can for example, be accompanied by a real rush of air past one's ear (that is actually generated by the seat in front).

One can employ the same mix of real and virtual objects to measure the distance of virtual objects—thereby *literally measuring the distance of an experience*. For example, in the film BUGS, a virtual spider appears to come down a thread suspended from the ceiling of the theatre to spin a web positioned about a foot in front of one's face. To measure the distance of the virtual spider from one's face, all one has to do is to line up one end of a measuring tape with the spider and place the other end on the tip of one's nose. As the virtual spider has no solidity, this measurement can, of course, only be a rough one, as one has to judge the alignment of the end of the tape with that of the spider. But that does not make quantification of apparent distance impossible. Similar comparisons of visual appearances with reference measuring objects are commonly made to quantify visual illusions in psychology experiments.

Note that although the distance of the virtual spider from one's face is real in the sense that it is (roughly) measurable, both the existence of the virtual spider and its location are observer-dependent. It is obvious, for example, if the entire audience closed their eyes for a moment that no virtual spiders would exist (in any sense) during that moment. It is also important to note that the location of each virtual spider, perceived by each member of the audience, is observer-relative to that member of the audience. Each virtual spider will appear about a foot in front of each observer's face, irrespective of how the observers are positioned relative to each other and the apparent distance of the virtual spider from a given observer will be affected in only a minor way if that observer moves around the room.

**A virtual reality thought experiment**

Suppose now that we replace the virtual spider with a real spider that spins its web about a foot in front of one's face, and for the purpose of this thought experiment, suppose that the virtual and real spider are visually identical. In this situation, the initiating causes of the observer's perceptual processing are different. In the virtual case, processing was based on information arriving at the visual system generated by the cinema screen combined with the polarised spectacles, while in this case it is initiated by the pattern of light reflectances from the surface of the spider itself. What is perceived is nevertheless the same—and, as before, one can line up one end of a measuring tape with the real spider and place the other end on the tip of one's nose to measure its distance from one's face.

While the existence of the spider in this instance is observer-independent in the sense that it will continue to exist and spin its web whether it is observed or not, its *appearance* remains observer-

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discussion. What matters here is that we can treat the location of *objects themselves* as observer-independent in the sense that they *have* a location whether they are being observed at any given moment or not.

dependent. Indeed there is no difference in this situation between the appearance of the real and virtual spider. Likewise, although the real spider can be said to have an observer-independent location relative to other objects in the world (it has a location relative to other objects whether it is observed or not)[37], each *observation* of its location can only be based on where it is *seen* to be, and is likewise observer-dependent. Indeed, if one uses the measuring tape in the way described above, the very same measurement operations can be applied, with the same result, to the real spider and the virtual spider!

And here's the point: The virtual reality thought experiment demonstrates that the very same measurement operations can be applied to real and virtual objects to determine their location—in spite of the fact that in the case of a virtual object, one is unambiguously measuring the location of an *experience*. It goes without saying that the existence and properties of such experiences are observer-dependent, as are the phenomenal properties of objects themselves. Nevertheless, in cases of veridical perception we habitually base our initial judgments about the nature of objects themselves on their observed phenomenal properties, and consequently judge their measured location (based on appearances) to be an observer-independent property of the object itself. Nor do we have any doubts that objects themselves are really out-there beyond the body surface.

Given this, are phenomenal objects *also* really out-there beyond the body surface? It depends on what one means by "really." If one means, "do they have an observer independent existence out-there in the world?", then of course they don't. But, if one means that they have a *measurable* distance and location out there in the world, then they really do. Is there any empirical evidence to the contrary? No. Such phenomenal objects do not appear to be, and certainly can't be measured to be located in the brain.[38]

**Is the phenomenal world physical or psychological?**

Let us turn, finally, to the ontology of the phenomenal world (in RM), which has also, at times, been puzzling to its critics. For example, in a recent on-line commentary on RM, Voerman (2003) asks,

[37] While both the apparent and actual distance of the spider from the observer will change if the observer moves away from or towards the spider, its location in relation to other immobile objects in the room will remain the same.

[38] Note that transparency theorists who argue that phenomenal properties are just physical properties of objects themselves are thereby committed to the view that such properties have both an observer-independent existence and a real location out there in the world. So, while they disagree with RM about the ontology of phenomenal properties, they agree that such properties have a genuine location out-there in the world that can be determined by measurement. However, virtual objects that are visually indistinguishable from real ones are a serious problem for this position, as their phenomenal properties appear to exist in spite of the fact that the virtual objects are nothing more than appearances. Conversely, biological naturalism, like RM, accepts that phenomenal properties are observer-dependent, but rejects measured location of phenomenal objects as a criterion of their "real" location as this would require BN to abandon the doctrine that phenomenal objects are really in the brain. As noted above, this doctrine has the absurd consequence that the real skull is beyond all the objects we could ever see (the skull beyond the visible universe), and, rather than abandoning their philosophical position, biological naturalists accept this consequence. However, the rejection of measured location as a criterion of actual location produces a further, serious problem for BN. Given that the normal method of determining location is to *measure* it, on what grounds, other than doctrinal ones, can one justify the rejection of measurement as a way of determining the locations of phenomenal objects, particularly where these correspond to the locations of the objects themselves?

"If there really is a phenomenal cat 'out there', on the table, in *addition to* the noumenal cat, then what kind of material is there on my table out of which the phenomenal cat is composed, and *how did it get there? Of* course, Velmans would not give a straight answer to this question, because he would not want to agree that there is *material* 'out there' in addition to the material out of which the noumenal table and cat are composed. For that would make him a substance dualist, and he wants to be a monist."

And Van de Laar (2003)[39] is puzzled by a similar issue,

"Should we take projection seriously and interpret Velmans as saying that the brain is in fact projecting 'stuff' onto the things themselves? This would amount to a world that contains the individual things themselves and further is smeared all over by projected phenomenal experiences belonging to all kinds of different creatures like for example Homo sapiens."

Scientific investigations of how experiences get to be 'out-there' (the investigation of mechanisms underlying perceptual projection) have already been discussed above.[40] However, the question of *what it is* that gets projected is a further, legitimate question. As noted in the introduction to this paper, reflexive monism is a dual-aspect theory (in the tradition of Spinoza) which argues that the one basic stuff of which the universe is composed has the potential to manifest both physically and as conscious experience. Given this potential, it seems reasonable to think of its ultimate nature as "psychophysical", rather than either psychological or physical.[41]

However, questions about the phenomenal world concern the *manifest* universe, and, conventionally, we think of the manifest universe as consisting of autonomously existing material objects that are observer-independent along with our conscious experiences of those objects that are observer-dependent. How does that address the questions raised by Voerman and Van de Laar above? The situation is shown in microcosm in Figure 3, where there is just one material cat out there in the world—the "noumenal" cat which exists whether the subject perceives it or not. When the subject or the external observer looks at the noumenal cat, it is a phenomenal cat that they see. So we have a cat itself (the noumenal cat) whose existence and nature is observer-independent, and a seen (phenomenal) cat that *represents* the noumenal cat, whose existence and nature is observer-dependent. In everyday life we usually think of the cat we see as a "physical cat" and, for the purposes of everyday life, we usually treat it as being the cat itself rather than a representation of the cat itself. But this does not double the number of *actual* cats, not does it 'smear' any additional phenomenal cats all over the noumenal cat. Rather, the one, noumenal cat has as many numerically distinct appearances as there are views of it by individual observers.

[39] Voerman (2003) and Van de Laar (2003) have both published detailed on-line commentaries on RM which do not appear to have been published in peer reviewed journals. Unfortunately these both contain many confusions about RM that I cannot address here as they would take us too far afield. However, some of the questions they raise are good ones, and exemplify common confusions that I am pleased to have the opportunity to address.

[40] Voerman (2003) also writes, "Sometimes, Velmans says that the cat experience is out there, but that this is 'phenomenally speaking'. What could that mean? If it means that the experience is *not* there *noumenally speaking,* then where is it, noumenally speaking?" In order not to lose sight of the issue under discussion (is the phenomenal cat in the brain or out there where it seems to be?) and given that physics offers a number of competing models for what Voerman refers to as "noumenal space", I have restricted my analysis to how phenomenal space relates to measured Euclidian space in the ways outlined above.

[41] A further discussion of these options is given in the reply to Rao, in Velmans (2002b) and in Velmans (2008).

Although it would be misleading to think of the phenomenal cat as composed of "physical material", it does have an ontology, that can initially be described in terms of it properties—and in the case of phenomenal cats, its properties are its *experienced* properties. It looks fat and furry, it feels sleek, warm and solid, it is seen to have a particular location and extension in phenomenal space and so on. Note again that in everyday life we habitually *treat* properties such as fat, furry, sleek, warm, solid, seen location and extension as "physical" properties of the cat itself—indeed, according to physicalist philosophers such as Tye and Block such properties *really are* properties of the cat itself (see critique of transparency theory above). However, according to RM these are only biologically evolved *representations* of the cat itself that Physics would describe in different ways. Its warmth for example, might be described in terms of the Brownian motion of its surface molecules, its solidity in terms of its internal molecular bindings, its apparent location and extension in terms of its measured location and extension relative to some reference frame, and so on. As before, each phenomenal property is "psychological" in the sense that it is an experienced property produced by preconscious interaction of the cat itself with the observer's perceptual-cognitive systems. But, conventionally, we also treat it as "physical" for the reason that it represents something about the actual (noumenal) cat that Physics would describe in a related, but often very different way.[42]

**How the phenomenal world relates to processing in the mind/brain**

Given that the phenomenal cat is in fact a psychological (mental) representation (of something that exists out there in the world), we can further specify its ontology by examining its relation to the processes that support it within the mind/brain. Here RM tells a conventional story. It assumes that each phenomenal feature of the cat has a distinct neural correlate that encodes the same information (about the cat). From the perspective of an external observer, this correlate will appear as a form of neural encoding (in neural state space), while from the subject's perspective the same information (about the cat) appears in the form of the phenomenal cat (in phenomenal space). Consequently, representations in the mind/brain have two (mental and physical) aspects, whose apparent form is dependent on the perspective from which they are viewed.[43] [44]

[42] That perceived phenomena can be thought of as either "physical" or "psychological" *depending on the relationships under consideration* has been recognised for well over 100 years, for example in the work of neutral monists such as Mach, James, and Russell. As Mach (1885) noted, "The traditional gulf between physical and psychological research ... exists only for the habitual stereotyped method of observation. A colour is a physical object so long as we consider its dependence upon its luminous source, upon other colours, upon heat, upon space, and so forth. Regarding, however, its dependence upon the retina ... it becomes a psychological object, a sensation. Not the subject, but the direction of our investigations is different in the two domains". RM develops the view that this applies to all observed phenomena in science, and this requires that we think of the "objective" versus "subjective distinction and the "public" versus "private" distinction in a more nuanced way. Strictly speaking there are no observer-free phenomena in science (phenomena whose appearance has not been influenced by the perception, cognition and observation arrangements available to an observer). The sciences nevertheless attempt to develop descriptions, explanations and theories about those phenomena that are not restricted to the ways that they are perceived. Space limits do not allow a proper analysis of these subtle issues here—but see Velmans (1999; 2000 chapter 8; 2007b) for extensive discussions.

[43] Viewed from an external observer's perspective, using their exteroceptive systems, the mind of a subject simply looks like a brain. So in the following discussion I will refer to it as a "brain" even though the ultimate

Given its intimate links to the brain, does it follow that the phenomenal world is *nothing more than a state of the brain*? No. Within RM neither the observations of external observers nor those of subjects have a privileged status. Suppose, for example, that I ask you to look at a cat out in the world while I examine the physical correlates of what you see in your brain (in the way shown in Figure 3). In terms of their *phenomenology*, my observations of your brain states are just my visual experiences of your brain states. While I examine your brain I simply report what I see (whether or not I am aided by sophisticated equipment), and while you are looking at the cat you simply report what you see. In this situation, we both experience something out in the world that we would describe as "physical". You have a visual experience of a cat, located beyond your body, out in the world. I have a visual experience of the physical correlates of your experience (the cat that you see) beyond my body, in your brain.

What you see is a phenomenal cat—a visual representation containing information about the shape, size, location, colour and texture of an entity that currently exists out in the world beyond your body surface. What I see is the same information encoded in the physical correlates of what you experience in your brain. That is, the information structure of what you and I observe is identical, but it is displayed or "formatted" in very different ways. From your point of view, the only information you have (about the entity in the world) is the phenomenal cat you experience. From my point of view, the only information you have (about the entity in the world) is the information I can see encoded in your brain. The way your information (about the entity in the world) is displayed appears to be very different to you and me for the reason that the "observational arrangements" by which we access that information are entirely different. From my external, third-person perspective I can only access the information encoded in your neural correlates by means of my visual or other exteroceptive systems, aided by appropriate equipment. Because you *embody* the information encoded in your neural correlates and it is already at the interface of your consciousness and brain, it displays "naturally" in the form of the cat that you experience.[45]

You experience a cat, rather than your neural encodings of the cat for the reason that it is the information *about the world* (encoded in your neural correlates) that is manifest in your experience rather than the embodying format or the physical attributes of the neural states themselves.[46] I observe/experience the neural encodings of the cat in your brain (rather than the cat) for the simple

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nature of mind may be better described as "psychophysical" (see below, discussion in Velmans, 2000 chapter 11, and Velmans, 2002a,b, 2008).

[44] Note that, on this issue, RM adopts a dual-aspect theory of information. Note too that this provides a way of making sense of James's observation "that what is evidently one reality should be in two places at once, both in outer space and in a person's mind." The external phenomenal world appears to exist in what we normally think of as the external space surrounding our bodies, but it is nevertheless a mental representation (of the world itself) and it is, in this sense, "in the mind." According to dual-aspect monism, the *information* displayed in such spatially extended phenomenal representations is also encoded in the brain (the mind as it appears when viewed from the outside)—providing another sense in which the same reality seems to be in two places at once.

[45] RM assumes that it is simply a "natural" empirical fact about the world that certain physical events in the brain (the correlates of consciousness) are accompanied by experiences. In short, this relationship follows some natural law, however mysterious this presently seems. Studies of perceptual projection (see above) and, more generally, the entire field of neuropsychology with its search for the neural correlates of consciousness (the NCC) are directly or indirectly devoted to discovering such natural laws.

[46] This is a rather simpler version of "transparency theory" that makes no reductive assumptions about the qualia of experience being nothing more than physical properties (either in the world or in the brain).

reason that my visual attention is focused on your brain, not the cat. If I wanted to experience what you experience, I would have to shift my attention (and gaze) away from your brain to the cat.[47]

From my "external observer's perspective," can I assume that what you experience is really nothing more than the physical correlates that I can observe? From my external perspective, do I know what is going on in your mind/brain/consciousness better than you do? Not really. I know something about your mental states that you do not know (their physical embodiment). But you know something about them that I do not know (their manifestation in experience). Such first- and third-person accounts of mind are *complementary and mutually irreducible*. We need your first-person story and my third-person story for a complete account of what is going on.[48]

**A different perspective on the "hard problem" of consciousness**

The view that these physical and experiential aspects of mind arise from what can best be described as a "psychophysical ground" also gives RM a different perspective on the classical "hard problem" of consciousness. In Western science the existence of matter is often taken for granted, while the existence of consciousness is regarded as mysterious. Consequently, the conventional "hard problem" refers to the difficulty of understanding how consciousness arises from (otherwise, insentient) physical matter, or, in other versions, about the seeming irreducibility of first-person accounts of conscious experience to third-person descriptions of the brain. But in truth, the existence of matter is as mysterious as the existence of consciousness, and there are similarly hard problems in physics. Why, for example, should electricity flowing down a wire be accompanied by a magnetic field around the wire, why should electrons sometimes behave as waves and at other times as particles, and why there should be any matter in the universe at all?

We simply assume these to be natural facts that we can observe in the world. We can try to explain them by incorporating them into some body of theory, but we do not agonize over their *existence*. If first-person and third-person accounts of the mind, along with the aspects of mind that they describe are complementary and mutually irreducible one would not expect to be able to derive one aspect from, or reduce one aspect to the other. It might just be a natural fact about the world that certain forms of brain functioning are accompanied by certain forms of first-person experience. That would require us to change a few of our pre-theoretical assumptions about the nature of matter and its relationship to consciousness, and we would still have to investigate the principles that govern the consciousness-brain relationship in great detail. But the fact that given conscious states accompany certain forms of brain functioning would then be "hard" to understand in the same sense as many facts in physics

[47] See the thought experiment on "Changing Places" and the extensive discussion of subjectivity, intersubjectivity and objectivity in Velmans (2000) chapter 8.

[48] This is *ontological monism*, combined with *epistemological dualism.* An introduction to "psychological complementarity" is given in Velmans (1991a) section 9.3, Velmans (1991b) sections 8 and 9, Velmans (1993a, 1996, 2000 chapter 11). An extensive discussion of how this can be applied to understanding the causal interactions of consciousness and brain is given in Velmans (2003). Note too, that according to RM, the first- and third person ways by which the mind can be known reveal its dual (experiential and physical) aspects—so ontological monism combined with epistemological dualism is entirely consistent with a dual aspect, monist ontology.

While the parallels are not exact (see Velmans, 2008) wave-particle complementarity in quantum mechanics provides a rough analogy. One can relate wave and particle properties of electrons to each other with great precision, but within physics, neither is regarded as more basic than, reducible to, or supervenient on the other. As in RM, such properties are regarded as complementary and mutually irreducible—and physics has to grapple with the very same issue of how to specify what it is that these properties *are properties of.* Just as RM opts to describe the fundamental nature of mind as "psychophysical", physics typically opts for descriptions that somehow combine wave and particle-like aspects, for example, describing electrons as "wave packets" or "electron clouds".

Without foreclosing on the possibility of a deeper understanding of electrons, e.g. in a mathematical form, quantum mechanics accepts that there is something deeply mysterious about the fundamental nature of matter. Without foreclosing on the possibility of a deeper understanding of mind, RM similarly accepts that there is something deeply mysterious about the way that consciousness and the material forms with which they correlate arise from some "psychophysical" ground.

**Conclusion**s

Although they are often neglected, the spatial nature of the phenomenal world and the apparent location and extension of phenomenal objects within that world are central features of phenomenal consciousness that any adequate theory of consciousness needs to explain. Such features are inconsistent with the classical dualist claim that consciousness (thought of as *res cogitans*) has no spatial extension, and they pose serious problems for both reductive and so-called 'nonreductive' physicalist theories that insist that the phenomenal world, despite its appearance, is inside the brain.

Although we normally think of the phenomenal world surrounding our body as the "physical world", it remains part of conscious experience rather than apart from it, which requires a more nuanced understanding of how the phenomenal "physical world" relates to the world as described by Physics and to the *world itself*. It also requires a different understanding of how experienced phenomena relate to the processes that support them in the brain. Reflexive monism suggests a way of understanding these relationships that neither splits the universe into two incommensurable mental and physical substances nor requires consciousness to be anything other than it seems. It neither splits consciousness from matter nor reduces it to a state of the brain. Instead, it suggests a seamless, psychophysical universe, of which we are an integral part, which can be known in two fundamentally different ways. Whether one adopts the perspective of an "external observer" or a "subject", the embedding surround, interacting with brain-based perceptual and cognitive systems provides the supporting *vehicle* for one's conscious view, and what we normally think of as the phenomenal "physical world" *constitutes* that view. Nor does reflexive monism ultimately separate the observer from the observed. In a reflexive universe, humans are differentiated parts of an embedding wholeness (the universe itself) that, reflexively, have a conscious view of both that embedding surround and the differentiated parts they think of as themselves.

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