**Thoughts on the Scientific Study of Phenomenal Consciousness**

Stan B. Klein

University of California, Santa Barbara

Author Notes: Please address all correspondence to Stan B. Klein, Department of Psychological and Brain Sciences, 551 Ucen Road, University of California at Santa Barbara, Santa Barbara, CA. 93106. Email:

klein@psych.ucsb.edu

Abstract

This paper is about the hard problem of phenomenal consciousness (i.e., how is subjective experience possible given the scientific presumption that everything from molecules to minerals to minds is wholly physical?). I first argue that one of the most valuable tools in the scientific arsenal (metaphor) cannot be recruited to address the hard problem due to the inability to forge connections between the stubborn fact of subjective experience and physically grounded models of scientific explanation. I then argue that adherence to the physicalist tenets of contemporary science has a limiting effect on a full appreciation of the phenomenon under discussion.

Thoughts on the Scientific Study of Phenomenal Consciousness

 Consciousness is a subject whose explication (much less existence) has captured the attention of dedicated and able thinkers for thousands of years. Despite the optimistic claims of a few (see below), perennial struggles with this topic show little evidence of imminent resolution.

According to contemporary thought, consciousness comes in a variety of kinds (e.g., sentience, access consciousness, noetic consciousness, autonoetic consciousness, temporal consciousness, core consciousness, reflective consciousness, primary consciousness, phenomenal consciousness; e.g., Klein, 2014a). My use of the term consists in the proposition that X is conscious if and only if there is “something it is like” for subject X to be in mental state Y” (e.g., Nagel, 1974). As Hacker observes “the subjective or qualitative feel of a consciousness experience…is characterized in terms of there being something it is like for an organism to have the experience.” (2002, p 160; emphasis in original). That is, consciousness, as I use the term, consists in first-person subjectivity. This usage is what most philosophers have in mind when discussing phenomenal consciousness (e.g., Chalmers, 1996; Klein, 2014a; Strawson, 2009), although a precise definition of “what it is like to be in a particular state” has proven to be notoriously difficult (e.g., Block, 1995).1

The explanatory challenge of phenomenal consciousness is called the hard problem: How does subjective experience (i.e., qualia) arise from physical2 objects and their relations (e.g., Banick, 2019; Chalmers, 1996; Clement & Malerstein, 2003; Georgalis, 2006; Jackson, 1982). Put differently, how is experiential reality (the aspect of reality of which we can be most certain; e.g., Gallagher and Zahavi, 2008; Midgely, 2014; Strawson, 2009; Wittgenstien, 1958) possible, given that the dictates of contemporary science stipulate that everything from molecules to minerals to minds is wholly physical (for reviews, see Crane & Mellor, 1990: Klein, 2016; Strawson, 2009).

 Some argue that the hard problem is, and will remain, intractable in consequence of its incommensurability with the requirements of scientific method and explanation (e.g., Wright, 2006; Levine, 2003). Others attribute its recalcitrance to conceptual limitations of the human mind (e.g., McGinn, 1991; Plonitsky, 2010). Still others deny the hard problem exists, arguing either (a) a scientific solution already is at hand (e.g., Graziano, 2019; Tsuchiya, 2016), or (b) the problem is chimeric -- a quixotic attempt to imbue substance to an ill-formed question (e.g., Carruthers, 2000; Dennett, 1991; Jackson, 2003).

Perhaps the most common stance among psychologists and neuroscientists is to allow that qualia constitute an aspect of reality, but do so solely as epiphenomena (e.g., Crane & Mellor, 1990; Jackson, 1982; Oakley & Halligan, 2017; for a recent review see W. Robinson, 2019). This existential devaluation is dictated by a robust, though often unreflective, allegiance to the metaphysical dogma of physicalism (for discussions see Klein, 2014a, 2016; Robinson, 2008). Since nonphysical aspects of reality are stipulated to be incapable of partaking in causal relations with the physical world (i.e., the principle of causal closure under the physical; e.g., Collins, 2008), consciousness, by definitional fiat, is stripped of any capacity to participate in physical reality. This, of course, is the modern version of Descartes’ Dilemma (e.g., Almog, 2002).

Saving the Phenomenon

Epistemic recalcitrance, however, does not sanction consigning “the feeling of what it is like” to ontological oblivion.Although no means currently are available for capturing phenomenal consciousness in scientific or philosophical discourse (e.g., Klein, 2012; McGinn, 2004; Plonitsky, 2010), subjective experience is “as real as rabbits and rocks.” (Strawson, 2009; p. 103). Indeed, its reality is the thing of which we can be most certain (e.g., Gallagher & Zahavi, 2008; Georgialis, 2006; Klein, 2014a; Shoemaker, 1968; Strawson, 2009; Varela, Thompson, & Rosch, 1993). To ignore experiential reality in consequence of scientific-philosophic intractability is to ignore what arguably is the most salient aspect of being.

The psychological topography of our mental constructs ultimately is based on personal acquaintance (cf. Russell, 1912/1999) with the experiential acts in which they are realized (e.g., Gallagher & Zahavi, 2008; Klein, 2012, 2014a, McGinn, 2004). There simply is no other way to reliably know what a mental state, qua mental state, entails (e.g., Klein, 2015; Robinson, 2008; Varela et al., 1993). While phenomenal experience eventually may prove grounded in events taking place at the neural, molecular, atomic, or subatomic level, reducing our phenomenology to the motion, shape, and size of its physical constituents (or knowledge thereof) cannot provide the knowledge we acquire in virtue of having the experience (e.g., Jackson, 1986; Klein, 2014a; Strawson, 2009). As Varela et al. (1993) note: “When it is cognition or mind that is being examined, the dismissal of experience (i.e., consciousness) becomes untenable, even paradoxical.” They continue “To deny the truth of our own experience in the scientific study of ourselves is not only unsatisfactory; it is to render the scientific study of ourselves without a subject matter.” (p. 13–14; parenthetical added for clarification).

In short, with mental states, subjective experience comes first. What remains in doubt is the explanation, not the phenomenon. In the next section I suggest one reason for this epistemological impasse

The Problem of Metaphor and Phenomenal Consciousness: “What is it like?”

“It is a natural impulse, when confronted with a phenomenon that we do not understand, to try to relate it to things that we do understand or at least are more familiar with.” (Roediger, 1980, p. 231).

Metaphors are indispensable to scientific and philosophical practice (e.g., Arbib & Hess, 1986; Bhushan & Rosenfeld, 1995; Hallyn, 2000; Konopka, 2002; Ortony, 1993; Stahl, 1987; Taylor & Dewsbury, 2018). They provide a way of understanding the character of epistemologically elusive phenomena by likening them to expressions that relate to other, better understood phenomena (e.g., Black, 1962; Boyd, 1993; Guttenplan. 2005; Kuhn, 1993).

To take a well-known example, in the early days of atomic research uncertain relations between components of atomic structure were likened to better understood relations between the heavenly bodies comprising our solar system (the so-called Bohr model of the atom -- according to which electrons were likened to planets orbiting a solar nucleus). Not only did this mapping help explain the wavelengths of spectral lines obtained from chemical elements, it also provided justification for the physical constants describing energies of transitions between orbital levels (e.g., Bohr, 1913, 1934; Margenau, 1950). In Jayne’s (1976) terminology, the solar system metaphier (that which is understood) helped explicate the metaphrand (that which currently lacks a satisfactory explanation).3

Even when a phenomenon is not accessible to direct observation, a metaphor can provide a context in which the mechanisms of the “hidden phenomenon” can be illuminated. As one example, for more than half a century psychologists and philosophers have enlisted Turing’s (1936) idealized computing device as the metaphier for the hidden workings of the neural machine (for a review see Gigerenzer & Goldstein, 1996).

In short, metaphors shed light on novel, puzzling or unobservable phenomena by forging connections between seemingly recalcitrant facts and scientifically sanctioned models. In consequence, they are widely considered an indispensable scientific tool (e.g., Black, 1962; Lakoff & Johnson, 1980; Ortony, 1993).

However, as valuable as metaphorical practice has been to scientific theory construction, its relevance to phenomenal consciousness can be called into question. Specifically, phenomenal consciousness appears to have a categorical irreducibility that makes it impossible to relate to or explain in terms of other categories of nature (e.g., Chalmers, 1996; Kant 1998).

Consider, as one example, the subjective experience of pain. “Painfulness is not a contingent property of pain, painfulness is the essence of pain; there is no appearance beyond the pain itself; I feel pain, the sensation of the pain is all I feel.” (Antonietti, 2008, p.52). It is non-sense to say that the experience of pain can be likened to something other than itself. Although we understand how the workings of, say, the mind might be understood in terms of the properties of a computational machine, we cannot understand how the experience of pain or any other mental state can be conceived in terms of anything other than the state itself (e.g., Gallagher & Zahavi, 2008; Jackson, 1986; Klein, 2014a; Strawson, 2009). If this is the case, then, contra Nagel, there is nothing it is like for subject X to experience mental state Y, other than Y itself.

Nagel, however, is adamant that his claim that the term “like” in the proposal that “there is something it is like for subject X to have experience Y” does not imply Y can be likened, compared or reduced to something other than itself: “…the analogical form of the English expression ‘what it is like’ is misleading. It does not mean ‘what (in our experience) it resembles,’ but rather ‘how it is for the subject himself.’" (1974, p. 440). For Nagel “the feeling of what it is like for subject X to experience Y” consists in an irreducible first-person thought about mental state Y qua mental state Y (in Lewis’s terminology, these are referred to as de se thoughts or indexicals; Lewis, 1979; see also Casteneda, 1966; Nagel, 1986; Perry, 1979).

One way of construing Nagel’s dictum is that he intended to set boundaries on the scope of discourse about de se thought.4  However, as Nagel clearly regards considerations of resemblance and comparison inappropriate for treatment of de se thought, his proposition also is consistent with the position that attempts to liken phenomenal consciousness to properties of better-understood phenomena are epistemologically meaningless. The only thing phenomenological conscious is “like” is “what it is like for the subject himself.”5

In short, Nagel’s “like” can be read both as an appeal to limit the scope of scholarly discourse as well as a de facto restriction on metaphoric applicability. The implication of the latter reading is particularly troubling for the scientific study of phenomenal consciousness. If one aspires to fit subjectivity into a scientifically proper epistemological framework, the proposition that de se indexicality cannot reach beyond “what it is like for the subject himself” ensures that the question “what is it like for subject X to experience Y?” cannot, in principle, be addressed metaphorically. Accordingly, one of science’s most valuable tools cannot be enlisted to address the hard problem of consciousness.

Science and Consciousness

While a scientific answer to the hard problem is difficult to envision, the existential status of the phenomenon is not in doubt. As Wittgenstein (1958) famously remarked, asking someone “are you sure it’s you who have pains?” (p. 67) is patent nonsense. It is nonsense because although our interpretation of the content of our experience may be inaccurate (e.g., two parallel lines appear to converge in the distance), we cannot be mistaken about having the experience (e.g., Shoemaker, 1968).

 I do not reject science, per se, as an approach to consciousness. What I take issue with is the assumption (often implicit) that current scientific method and dogma have exhausted our ways of apprehending and knowing reality (Tulving, personal communication, May 4, 2011). “Render to science what belongs to science, but we should not surrender all of reality too hastily lest we fail to encounter vast mysteries not accommodated by its particular set of assumptions and methodologies” (Klein, 2014a, p. 118).

 Contemporary science simultaneously is inclusive and restrictive. It is inclusive in its belief that everything falls within its theoretical jurisdiction, but it restricts what it allows to qualify as “everything” (e.g., Martin, 2008; Papa-Grimaldi, 1998). Put another way, modern science trades heavily on the assumptions that (a) those aspects of reality, as we currently understand them, are exhaustive of the whole (e.g., Jeans, 1943, 1981; Margenau, 1950; Planck, 1925/1993) and (b) the laws and constants of physics are universal in their domain of application (e.g., Bohr, 1934; Papa-Grimaldi, 1998; Poincare, 1952; Trusted, 1991).

 However, although scientists assume that their laws and constants remain unchanged at all times and in all places (e.g., Poincare, 1952; Spencer-Brown, 1957; Uttal, 2008), contact with reality is, in fact, limited to what we can observe locally (e.g., Earle, 1955; Shallis, 1993; Uttal, 2008). “To extend that knowledge requires both an act of faith in the uniformity of nature and a compromise with truth, for knowledge has an inbuilt uncertainty to it (e.g., Heisenberg’s principle of indeterminacy)”. (Shallis, 1986, p. 32; comment in parenthesis mine).

 In short, to maintain that materialism, physicalism, idealism or any monistic metaphysic exhausts the nature of reality is to substitute doctrine for demonstrable fact. Such a stance forecloses what we allow to stand as reality by presuming that we have license to assert that reality, in its fullness, can be captured by our current concepts, methods and instruments of measurement (e.g., (e.g., Eddington, 1958; Elvee, 1992; Feyerabend, 1979; Horst, 2007; Jeans, 1943; Margenau, 1984; Papa-Grimaldi, 1998; Tallis, 2008; Trusted, 1999; Vaihinger, 1925; Van Inwagen, 2002).

To declare that consciousness cannot exist (except in a materialist incarnation) is a metaphysical conceit lying outside what can be operationally justified (e.g., Earle, 1955; Klein, 2012, 2014a, b; Martin, 2008). As Ricard and Thuan (2001) observe, “If we define the terrain field of science as what can be physically studied, measured, and calculated, then right from the start we leave out everything that is experienced in the first person (e.g., subjectivity)…If we forget this limitation, then we soon start affirming that the universe is everything that can be objectified in the third person…” (p. 241; parenthesis added for clarification).

 Quite possibly we need a new, more inclusive, metaphysics -- one in which reality is not reduced only to what can be manipulated by current scientific methods (e.g., Gendlin, 1962; Klein, 2012, 2014a, b; Martin, 2008). At present we have no way of surveying the whole of reality (e.g., Earle, 1955, 1973). Accordingly, to maintain that all of reality can be captured by a single set of methods (e.g., scientific) is to claim that reality consists in its entirety of objects and their relations. This, I maintain, is unreasonable (see also Earle, 1955, 1972; Feyerabend, 1979; Fodor, 1974; Kitchener, 1988; Meixner, 2008; Martin, 2008; Nagel, 2012; Papa-Grimaldi, 1998; Valera et al., 1993).

To posit that consciousness is capable of being grasped by such circumscribed aspects of reality as matter, energy, or, more abstractly, mathematical formalisms and universal laws is a very restrictive enterprise – one that presupposes we have warrant to declare (without concrete evidence) that reality, in its fullness (i.e., experiential as well as physical), can be captured by such constructs (e.g., Feyerabend, 1979 Jackson, 1986; James, 1909/1996; Margenau, 1984; Papa-Grimaldi, 1998; Valera et al., 1993; van Fraasen, 2005). As the scope of metaphysical possibility gradually broadens – and I believe that, of practical necessity (cf., Kuhn, 1962), it eventually will – the fullness of reality will unfold in ways unimaginable from within the shackles of a purely materialist metaphysics.

References

Almog, J. (2002). What am I?: Descartes and the mind-body problem. Oxford UK:

 Oxford University Press.

Antoietti, A. (2008). Must psychologists be dualists? In A. Antonietti, A. Corradini, A., & E.J.

 Lowe (Eds.). Psycho-physical dualism: An interdisciplinary approach (pp. 37-67).

 Boulder, CO: Rowman & Littlefield Publishers, Inc.

Arbib, M. A., & Hess, M. B. (1986). The construction of reality. New York, NY:

 Cambridge University Press.

Banick, K. (2019). What is it like to think about oneself? De se thought and phenomenal

 intentionality. Phenomenology and the Cognitive Sciences, 18, 919-932.

Bhushan H., & Rosenfeld, S. (1995). Metaphorical models in chemistry. Journal of

 Chemical Education, 72, 578-582.

Black, M. (1962). Models and Metaphors. Ithaca, NY: Cornell University Press Books.

Block, N. (1995). On a confusion about a function of consciousness. Behavioral and Brain

 Sciences, 18, 227-287.

Bohr, N. (1913). On the constitution of atoms and molecules, part I. Philosophical Magazine,

 26, 1–24.

Bohr, N. (1934). Atomic theory and the description of nature. Cambridge, UK: Cambridge

 University Press.

Boyd, M. (1993). Metaphor and theory change: What is “metaphor” a metaphor for? In

 A. Ortony (Ed.). Metaphor and thought (2nd Ed., pp. 481-532). Cambridge, UK:

 Cambridge University Press.

Carruthers, P. (2000). Phenomenal Consciousness: A Naturalistic Theory. Cambridge, UK:

 Cambridge University Press.

Castañeda, H-Ni. (1966). ‘He’: A study in the logic of self-consciousness. Ratio, 8, 130–157.

Chalmers, D.J. (1996). The conscious mind: In search of a fundamental theory. New

 York, NY: Oxford University Press.

Clement, F., & Malerstein, A. J. (2003). What is it like to be conscious? The ontogenesis

 of consciousness. Philosophical Psychology, 16, 67-85.

Collins, R. (2008). Modern physics and the energy-conservation objection to mind-body

 dualism. American Philosophical Quarterly, 45, 31-42.

Crane, T., & Mellor, D. H. (1990). There is no question of physicalism. Mind, 99*,* 185–206.

Dennett, D. C. (1991). Consciousness explained. Boston, MA: Little, Brown and Company.

Earle, W. (1955). Objectivity: An essay on phenomenological ontology. New York,

 NY: The Noonday Press.

Earle, W. E. (1972). The autobiographical consciousness. Chicago, IL: Quadrangle Books.

Eddington, A. (1958). The philosophy of physical science. Ann Arbor, MI: The

 University of Michigan Press.

Elvee, R. Q. (1992). The end of science? Attack and defense: Nobel conference XXV.

 Lanham, MD: University Press of America, Inc.

Feyerabend, P. (1979). Against Method: Outline of Anarchistic Theory of Knowledge.

 New York, NY: Verso.

Fodor, J. A. (1974). Special sciences (Or: The disunity of science as a working hypothesis).

 Synthese, 28, 97-115.

Gallagher S, & Zahavi D. (2008). The phenomenological mind. New York, NY: Routledge.

Gendlin, E. (1962). Experiencing and the creation of meaning: A philosophical and

 psychological approach to the subjective. Evanston, IL: Northwestern University

 Press.

Georgalis, N. (2006). The primacy of the subjective. Cambridge, MA: MIT Press.

Gigerenzer, G., & Goldstein, D. G., (1996). Mind as computer: Birth of a metaphor.

 Creativity Research Journal, 9, 131-144.

Graziano, M. S. (2019). Rethinking consciousness: A scientific theory of subjective

 experience. New York, NY: W.W. Norton & Company.

Guttenplan, S. (2005). Objects of metaphor. Oxford, UK: Oxford University Press.

Hacker, P. M. S., (2002). Is there anything it is like to be a bat? Philosophy, 77, 157-174.

Hallyn, F. (2000). Metaphor and analogy in the science. Dordrecht, The Netherlands:

 Kluwer Academic Publishers.

Horst, S. (2007). Beyond reduction: Philosophy of mind and post-reduction philosophy

 of science. New York, NY: Oxford University Press.

Jackson, F. (1982) Epiphenomenal qualia. The Philosophical Quarterly, 32, 127-136.

Jackson, F. (1986). What Mary didn't know". Journal of Philosophy, 83, 291-295.

Jackson, F. (2003). Mind and illusion. In A. O’Hear (Ed.), Minds and persons (pp. 251–272).

 Cambridge, UK: Cambridge University Press.

James, W. (1909/1996). A pluralistic universe. Lincoln, NE: university of Nebraska

 Press.

Jaynes, J. (1976). The origin of consciousness in the breakdown of the bicameral mind. Boston,

 MA: Houghton Mifflin.

Jeans, J. (1943). The mysterious universe; New Revised edition. New York: NY: The

 Macmillan Company.

Jeans, J. (1981). Physics and philosophy. New York, NY: Dover Publications.

Kitchener, R. F. (1988). The world of contemporary physics: Does it need a new

 metaphysics? Albany, NY: State University of New York Press.

Klein, S.B. (2012). The self and its brain. Social Cognition, 30, 474-516.

Klein, S. B. (2014a). The two selves: Their metaphysical commitments and functional

 independence. New York, NY: Oxford University Press.

Klein, S. B. (2014b). What can recent replication failures tell us about the theoretical

 Commitments of psychology? Theory & Psychology, 24*,* 326–338.

Klein, S. B. (2015). What memory is. WIREs Cognitive Science, 6*,* 1–38.

Klein, S. B. (2016). The unplanned obsolescence of psychological science and an argument for

 its revival. Psychology of Consciousness Consciousness: Theory, Research, and

 Practice, 3, 357–379.

Konopka, A. K. (2002). Grand metaphors of biology in the genome era. Computers and

 Chemistry, 26, 397-401.

Kuhn, T. S. (1962). The structure of scientific revolutions. Chicago, IL: University of

 Chicago Press.

Kuhn, T. (1993). Metaphor in science. In A. Ortony (Ed.). Metaphor and thought (2nd Ed., pp.

 533-542). Cambridge, UK: Cambridge University Press.

Lakoff, G., & Johnson, M. (1980). Metaphors we live by. Chicago, IL: University of

 Chicag Press.

Lakhtakia, A. (1996). Models and modelers of hydrogen. River Edge, NJ: World Scientific.

Levine, J. (2003). Knowing what it is like. In B. Gertler (Ed.), Privileged access:

 Philosophical accounts of self-knowledge (pp. 45-53). Hampshire, UK: Ashgate.

Lewis, D. (1979). Attitudes de dicto and de se. The Philosophical Review, 88, 513–543.

Margenau, H. (1950). The nature of physical reality. New York, NY: McGraw Hill.

Marganau, H. (1984). The miracle of existence. Woodbridge, CT: Ox Bow Press.

Martin, C. B. (2008). The mind in nature. Oxford, UK: Oxford University Press.

McGinn, C. (1991). The problem of consciousness: Essays toward a resolution.

 Oxford, UK: Blackwell Publishers.

McGinn, C. (2004). Consciousness and its objects. Oxford, UK: Oxford University Press.

Meixner, U. (2008). The *reductio* of reductive and non-reductive materialism – and a new

 start. In A. Antonietti, A. Corradini, A., & E.J. Lowe (Eds.). Psycho-physical dualism:

 An interdisciplinary approach (pp. 143-166). Boulder, CO: Rowman & Littlefield

 Publishers, Inc.

Midgley, M. (2014). Are you an illusion?New York, NY: Routledge.

Nagel, T. (1974). What is it like to be a bat? Philosophical Review, 83, 435-450.

Nagel, T. (1986). The View from nowhere, New York, NY: Oxford University Press.

Nagel, T. (2012). Mind & Cosmos: Why the materialist neo-Darwinian conception of nature is

 almost certainly wrong. Oxford, UK: Oxford University Press.

Oakley, D. A., & Halligan, P. W. (2017). Chasing the rainbow: The non-conscious nature

 of being. Frontiers in Psychology, 8: 1924. DOI: 10.3389/fpsyg.2017.01924.

Ortony, A. (1993). Metaphor and thought (2nd Ed.). Cambridge, UK: Cambridge University

 Press.

Papa-Grimadli, A. (1998). Time and Reality. Aldershot, UK: Ashgate.

Perry, J. (1979). The problem of the essential indexical. Noûs, 13, 3–21.

Planck, M. (1925/1993). A survey of physical theory. New York, NY: Dover Publications.

Plonitsky, A. (2010). Epistemology and probability. New York, NY: Springer.

Poincare, H. (1952. Science and hypothesis. New York, NY: Dover Publications, Inc.

Ricard, M. & Thuan, T. X. (2001). The quantum and the lotus. New York, NY: Three Rivers

 Press.

Robinson, D. N. (2008). Consciousness and mental life. New York, NY: Columbia University

 Press.

Robinson, W. (2019). Epiphenomenalism. The Stanford Encyclopedia of Philosophy.

URL = <https://plato.stanford.edu/archives/sum2019/entries/epiphenomenalism/>.

Roediger, H. L. (1980). Memory metaphors in cognitive psychology. Memory & Cognition,

 8, 231–246.

Russell, B. (1912/1999). The problems of philosophy. Mineola, NY: Dover Publications.

Shallis, M. (1983). On time: An investigation into scientific knowledge and human experience.

 New York, NY: Schoken Books.

Shoemaker, S. (1968). Self-reference and self-awareness. The Journal of Philosophy, 65*,*

555–567.

Spencer Brown, G. (1957). Probability and scientific inference. London, UK: Longmans,

 Green and Co.

Stahl, F. A. (1987). Physics as metaphor and vice versa. Leonardo, 20, 57-64.

Stone, J. (2001). What is it like to have an unconscious mental state? Philosophical

 Studies, 104, 179-202.

Strawson, G. (2009). Mental reality (2nd ed.). Cambridge, MA: MIT Press.

Tallis, R. (2008). The enduring significance of Parmenides: Unthinkable thought. London,

 UK: Continuum International Publishing Group.

Taylor, C., & Dewsbury, B. M. (2918). On the problem of metaphor use in science and

 science communication. Journal of Microbiology & Biology Education, 18, 1-5.

 DOI: <https://doi.org/10.1128/jmbe.v19il.1538>.

Trusted, J. (1991). Physics and metaphysics: Theories of space and time. New York, NY:

 Routledge.

Trusted, J. (1999). The mystery of matter. New York, NY: St. Martin’s Press.

Tsuchiya, N. (2017). “What is it like to be a bat?” – a pathway to the answer from the

 integrated information theory. Philosophy Compass, e12407, 1-13.

 DOI 10.1111/phc3.12407.

Turing, A. M. (1936). On computable numbers, with an application to the entscheidungsproblem. Proceedings of the London Mathematical Society, 42, 230–265.

Uttal, W. R. (2008). Time, space, and number in physics and psychology. Cornwall-on-

 Hudson, NY: Sloan Publishing.

Vaihinger, H. (1925). The philosophy of “as if”. New York, NY: Harcourt, Brace, &

 Company, Inc.

Valera, F.J., Thompson, E., & Rosch, E. (1993). The embodied mind: Cognitive science and

 human experience. Cambridge, MA: The MIT Press.

van Fraasen, B. C. (2005). Transcendence of the ego (The non-existent knight). In G.

 Strawson (Ed.). The self? (pp.87-110). Malden, MA: Blackwell Publishing.

Van Inwagen, P. (2002). Metaphysics (2nd Ed.). Cambridge, MA: Westview Press.

Wider, K. (1990). Overtones of solipsism in Thomas Nagel's "what is it like to be a bat?" and

 the view from nowhere. Philosophy and Phenomenological Research 50, 481-499.

Wittgenstein, L. (1958). The blue and brown books (Rush Rees, Ed.). New York, NY:

 Harper and Row.

Wright, W. (2007). Explanation and the hard problem. Philosophical Studies, 132, 301-330.

Footnotes

1. To avoid expositional repetition, I use several terms to refer to phenomenal consciousness – e.g., subjectivity, qualia and experiential reality. While these designations are not exact synonyms, their family resemblances are sufficiently close to allow one to stand proxy for another.

2. The terms material and physical both are used to refer to the doctrine that everything that exists, exists wholly as matter. Although they are not strictly synonymous (for a discussion, see Klein, 2016), in what follows I will not distinguish between them when discussing the metaphysical doctrine that nature is limited to facts about matter and its interactions.

3. The solar system metaphier ultimately proved unsatisfactory, generating numerous paradoxes and inconsistencies (e.g., Lakhtakia, 1996).

4. Since Nagel has never been entirely clear what “an irreducible first-person thought about mental state Y qua mental state Y” implies (e.g., Block, 1995), analysis of his thesis, even in his carefully circumscribed domain, has generated considerable debate and analysis (e.g., Banick, 2019; Block, 1995: Clement & Malerstein 2003; Hacker, 2002; Georgalis, 2006; Stone, 2001; Tsuchiya, 2016; Wider, 1990).

5. Some of my reviewers argue that metaphors for pain readily are available: For example, widely used pain scales request the patient rate pain sensation in terms of its degree of stabbing, dullness, burning, etc. But likening pain to a feeling of stabbing or burning (which is to engage in simile, not scientific use of metaphor) is substituting one unknown (the feel of pain) for another unknown (e.g., the feel of stabbing). That is, both metaphrand and metaphier are irreducibly subjective, thus rendering the use of metaphor (actually simile) an exercise in logical circularity.

 While one can liken a particular experiential state Y (e.g., the experience of the color blue) to another, non-Y mental state Z (e.g., the experience of the color blue is like [the experience of] a cloudless, midday sky; the experience of the color blue is like the feeling of cool tranquility), the metaphrand and metaphier both remain firmly embedded within the same “to-be-explained” ontological domain -- subjective phenomena.

In short, metaphorical treatment of experiential reality (e.g., phenomenal consciousness) is tautological. By contrast, the use of metaphor in the scientific exploration of physical reality does not fall victim to this logical cul-de-sac (Compare: “The brain is like a computer”. Here the metaphrand and metaphier occupy clearly distinct ontological categories – organic and inorganic – one of which is better understood than the other).