

Psychological Closure Does Not Entail Cognitive Closure

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ABSTRACT

According to some philosophers, we are “cognitively closed” to the answers to certain problems. McGinn has taken the next step and offered a list of examples: the mind/body problem, the problem of the self and the problem of free will. There are naturalistic, scientific answers to these problems, he argues, but we cannot reach them because of our cognitive limitations. In this paper, we take issue with McGinn’s thesis as the most well-developed and systematic one among the so-called “new mysterians”. McGinn aims to establish a strong, representational notion of cognitive closure: a principled inaccessibility of a true theory of certain properties of the world, but he offers arguments that only bear on difficulties with psychologically grasping the correct answers. The latter we label psychological closure. We argue that representational closure does not follow from psychological closure, and that McGinn’s case therefore falters. We could very well be able to represent the correct answer to some question, even without being able to grasp that answer psychologically. McGinn’s mistake in deriving representational closure from psychological closure rests on a fallacy of equivocation relating to the concept of ‘understanding’. By making this distinction explicit, we hope to improve our thinking about the limits of science in particular and human knowledge in general.

1. Introduction

Since the dawn of philosophy, gauging the limits of human knowledge has been a constant occupation. Are there some questions out there, the answers to which will forever elude us? Are there aspects of the world that will forever remain hidden? With the advent of the Darwinian theory of evolution, this age-old question has been cast in a new light. A bleak light, according to some. Indeed, if the human brain is the product of a long and capricious process of biological evolution, and the difference between humankind and other animal species is but a difference of degree, what reasons do we have to suspect that our best epistemic efforts will penetrate the deepest mysteries of the universe? Or to put it in Darwin’s (1881) own dramatic words:

With me the horrid doubt arises whether the convictions of man’s mind, which has been developed from the mind of the lower animals, are of any value or at all

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trustworthy. Would anyone trust in the convictions of a monkey's mind, if there are any convictions in such a mind?

A number of prominent authors – such as Chomsky (1975, 1980, 1988, 2000), Fodor (1981, 1983), Nagel (1986) and McGinn (1989, 1993, 1994) – have risen to the occasion. These epistemological pessimists, sobered by our humble origins, have argued for cognitive closure: some truths about the universe will forever remain beyond our ken. Our paltry brains are just not up to the task. They evolved to deal with a series of adaptive problems in our immediate ecological environment, not to unravel the fundamental nature of the universe.

McGinn has treated the subject most extensively. According to McGinn's position (1993, 1994), which he calls “transcendental naturalism”, the human mind is cognitively closed to the answers to certain problems, not because those problems are different in nature than solvable scientific problems, but because the particular structure of our minds obstructs knowledge of their answers. They “transcend” our cognitive capacities, but at the same time are not supernatural; not ontologically different from the natural problems we can solve. This, he believes, is the best explanation for the fact that certain problems continue to baffle us. Our mind is simply not equipped to come up with answers to these problems. And the fact that we are cognitively closed to these answers shouldn't surprise us. The human brain is a particular biological organ, with its attendant abilities and limitations. Much as a dog is cognitively closed to the properties of electrons, we are closed to certain aspects of the world. Examples of such problems are: the mind/body problem, the self, meaning and intentionality, free will, a priori knowledge, and knowledge in general – the problems which have typically caused philosophical perplexity throughout the history of human thought.¹

McGinn expands on the mind-body problem:

How is it possible for conscious states to depend upon brain states? How can technicolour phenomenology arise from soggy grey matter? What makes the bodily organ we call the brain so radically different from other bodily organs, say the kidneys – the body parts without a trace of consciousness? How could the aggregation of millions of individually insentient neurons generate subjective awareness? We know that brains are the de facto causal basis of consciousness,

¹ McGinn also offers a more targeted argument for his view that we are cognitively closed to these problems. According to McGinn, the way our minds work prevents them from coming up with answers to certain problems. Our minds, according to McGinn, work in a combinatorial fashion. This is his so-called CALM-conjecture which stands for ‘Combinatorial Atomism with Lawlike Mappings’. We grasp the world and its phenomena by accounting for it in terms of a set of primitive elements and their ‘lawlike’ interactions. Certain problems, however, cannot be grasped in this fashion. “Conscious states”, McGinn claims, “are not CALM-construable products of brain components” (1993, 37), much as the self and free-will, among those other problems, resist being answered in terms of the particular framework our minds must employ in thinking about the world.

but we have, it seems, no understanding whatever of how this can be so. It strikes us as miraculous, eerie, even faintly comic. [...] The mind-body problem is the problem of understanding how the miracle is wrought, thus removing the sense of deep mystery. We want to take the magic out of the link between consciousness and the brain (McGinn 1989, 349).

McGinn (1989, 350) suggests that the mystery arises because we are “cut off by our very cognitive constitution from achieving a conception of that natural property of the brain (or of consciousness) that accounts for the psychophysical link”. We do not, in other words, have the conceptual grasp at our disposal to understand the nexus between mind and body, or between consciousness and brain. The result is what McGinn calls “cognitive closure” and what others – such as Fodor (1981, 1983) – have called epistemic boundedness.

At the core of McGinn’s arguments for cognitive closure, however, we detect a fallacy of equivocation. As we will show, McGinn aims to establish closure in a representational sense but only offers psychological arguments in support – i.e. arguments targeted at our inability to make intuitive sense of the answers to certain problems. In order to show where his reasoning goes astray, we start by clarifying the notion of cognitive closure (section 2), which is often left implicit in the literature. Making this explicit should give us a firmer grip on the issue and set the stage for a critical analysis of McGinn’s arguments. In section 3, we distinguish representational from psychological closure, and in section 4 we point out that McGinn’s arguments for cognitive closure only bear on psychological closure. In section 5, we show that representational closure doesn’t follow from psychological closure and McGinn’s arguments consequently misfire. We also explain why both types of closure are often conflated, which explains McGinn’s mistake.

2. *What constitutes closure?*

At the cutting edge of science, there are many problems for which scientists have not come up yet with (adequate) solutions. It is also safe to assume that, at the current stage of human inquiry into nature, there remain many aspects and properties of the world which are not on our radar. Do all these hiatuses amount to what McGinn calls cognitive closure? Obviously not. A number of necessary and jointly sufficient conditions warrant the diagnosis of cognitive closure. All of these are at least implicit in McGinn’s argument, but it will be useful to spell them out more clearly.

The first is that the source of closure must be *cognitive*. In McGinn’s definition: “A type of mind M is cognitively closed with respect to a property P (or theory T) if

and only if the concept-forming procedures at M's disposal cannot extend to a grasp of P (or an understanding of T)" (McGinn 1989, 350). In other words, we are cognitively closed to an aspect of the world only if the source of this closure is a limitation of the cognizer, not if the source of closure is extra-cognitive. Take for example the fact that, due to our particular and contingent place in time and space, we cannot make observations beyond the outer edges of the visible universe. This is not a cognitive limitation of human beings. Any extraterrestrial being, no matter its cognitive and perceptual faculties, would be in the same predicament. If this is the case, the source of closure is not the consequence of limitations of the cognizer and would not be a candidate for cognitive closure as it is intended by McGinn and colleagues. Or take indeterministic processes. Given that some natural processes involve indeterministic causes, outcomes in which such processes are involved would be in principle unpredictable. Failure to predict these outcomes with certainty would not be the consequence of limits of our cognitive abilities, but of the very nature of the object of our study. Even the hypothetical perfect god-like mind would be closed in these contexts. Such cases do not constitute 'cognitive closure'.

The second necessary condition for cognitive closure is that it follows *in principle* from human cognitive limitations. Some aspects of the world elude us, or so the proponent of closure argues, not as a matter of fact, but as a matter of *principle*. Chomsky (2000, 83), for instance, distinguishes problems and mysteries. While problems are unsolved at present but solvable in principle, mysteries are unsolvable in principle. Claims of closure only rightfully apply to the latter. What is at stake is not the trivial claim that, *de facto*, some aspects of the world are unknown to us, nor even that some aspects will remain unknown to us (for lack of time, interest or resources, for example). Claims of cognitive closure are *de jure* claims: in principle, some aspects of the world – such as, according to McGinn (1989), the psycho-physical nexus – must remain unknown to beings like us. We just don't have the proper cognitive arsenal at our disposal to ever penetrate these particular aspects of the world.

Finally, cognitive closure refers to complete cognitive inaccessibility. If we are cognitively closed to some property P of the world, it is simply impossible for us to come up with a true theory or description of P (McGinn 1994, 145). This inaccessibility is the most important point in the context of this paper. It is implicit in McGinn's defense of transcendental naturalism and in his dismissal of rival philosophical approaches to the hard problems.

In the face of philosophical perplexity, according to McGinn (1993, 1994), philosophers have previously adopted something called 'DIME' responses, an acronym standing for four different strategies. A first strategy is to Domesticate (D) the problem by providing a reductive theory. In the case of the mind-body problem, this is the materialist or functionalist strategy, where "to be in a conscious state is just to be in a certain sort of physical state – a neural state or

a state defined by causal role” (1993, 32). This reduces the problematic mind side of the equation to the unproblematic body side, but – according to McGinn – it does not solve the problem. A second strategy is to declare the subject intrinsically Irreducible (I). It is “ontologically basic, an explanatory terminus”, “sui generis”, a matter of brute and inexplicable fact (32–33). End of story. A third and related strategy is to declare it Magical (M): there simply is no naturalistic explanation for the fact that the mind supervenes on neural activity. It is supernatural (think Cartesian dualism). A fourth strategy, finally, is to Eliminate the problem (E): “There is no such thing as consciousness”.

All four strategies, prevalent in philosophy, are attempts to get an intuitive grip on those (allegedly) unsolvable problems. Indeed, many philosophers in the field, notably those adopting the first and fourth strategy (Domesticating and Eliminating), have actually claimed to have developed some understanding of the mind-body problem. For McGinn, however, they are just deluded. Human beings, including those philosophers, are still very much cognitively closed to the mind-body problem, even though some of them fooled themselves, by Domesticating the problem, into thinking that they aren’t, or by Eliminating it, into thinking that there wasn’t a problem in the first place. The pretense of these philosophers to understand the mind-body problem does not diminish their ignorance in the least. McGinn demands genuine representational access, meaning a true natural (scientific) explanation of the phenomenon in question. After all, McGinn’s transcendental naturalism presupposes that such an explanation does exist.

As we intend to show in section 4, however, McGinn bases his conclusion of cognitive (i.e. representational) closure on arguments that merely bear on psychological closure. The two need to be kept distinct, as psychological closure does not entail cognitive closure. This is the subject of the following sections and the central point of this paper.

3. *Representational versus psychological closure*

Given that cognitive closure refers to the principled inability to produce the true theory of a property of the world, claims of cognitive closure are representational in nature. They argue that some properties cannot be represented by humans. Representational closure should not be conflated with what we call psychological closure. Representational closure refers to the principled impossibility of producing the true theory T describing a property P. Psychological closure refers to the principled impossibility of obtaining a psychological sense of understanding or an intuitive grasp of that true theory T. One does not entail the other. Having a psychological sense of understanding of a theory T describing a property P does

not preclude you from being cognitively (representationally) closed to that property P, provided that the theory T is false and the true theory is out of reach. But neither does lacking a psychological sense of understanding (psychological closure) preclude you from having cognitive access. The latter hypothesis might seem implausible at first sight, but as we will show, it isn't all that far-fetched.

Having cognitive access to an aspect or property of the world (i.e. not being cognitively closed to that property) means being able to represent that aspect or property accurately. Representing an aspect of the world means translating (some of) its properties into an intelligible medium. Representations are conceptually linked with the state of the world they represent. For any given true representation, it must hold that, had the object it represents been different, that representation would have been false. This is all rather straightforward when it comes to representing, but confusion sets in when we consider understanding.

Now what does 'understanding' mean? We need to distinguish between two different senses. In the first sense, 'understanding' is a particular form of representing, but a more substantial cognitive achievement (Kvanvig 2003; Elgin 2012). To understand something, you need a coherent web of representations about a subject matter. It involves an "interconnected network of commitments that suitably bear on the relevant facts" (Elgin 2012). In this (first) sense, understanding requires an accurate representation of the relevant facts, and is thus a "success term" (Elgin 2012). Given that we understand an aspect of the world, it must be true that, had the world been (substantially) different, our alleged understanding would not qualify as 'understanding', because it would not have provided us with cognitive access to that aspect of world. You don't understand the motion of the sun observed from the earth if you adopt a geocentric model. We call this kind of understanding 'representational understanding', since whether or not we understand something depends on whether or not it represents the world (truthfully).

The word 'understanding', however, is also used in a psychological sense. In the psychological sense, understanding, is not a matter of accurately describing an aspect or property of the world, but of psychologically grasping a theory. Understanding in this sense is also a success term. However, its success does not depend on the theory connecting with the world, but on the mind connecting with (or grasping) the theory. In this regard, one can have a correct and full understanding of a theory (successfully understanding it) even if the theory is false. For example, one could have a correct understanding of Ptolemy's geocentric astronomy, even if it does not represent our solar system accurately. When we are prevented in principle from having a psychological sense of understanding of theory, we are – what we call here – psychologically closed to that theory. This, we will argue, does not entail that we are representationally closed to the property that this theory describes.

Given the above we can distinguish between four possible cognitive predicaments, with respect to a property/entity X in the world:

- (1) We have representational access to a property P and have psychological understanding of the true theory describing P (we have or can in principle have a psychologically graspable true theory of P).
- (2) We are representationally closed to a property P and are psychologically closed to the true theory describing P (the true theory of P is out of reach *and* if it were magically presented to us, it would be psychologically ungraspable).
- (3) We are representationally closed to P but psychologically understand a theory that does not represent P truthfully (e.g. correctly understanding Domesticating and Eliminating responses to problems to which we are in fact cognitively closed, according to McGinn).
- (4) We have representational access to P but are psychologically closed to the true theory T that describes P (so we have a true theory of P but we cannot grasp it).

Whenever McGinn detects cognitive closure to a property P, he overlooks the possibility of predicament 4 (representational access but psychological closure), which leads him to immediately infer predicament 2 (representational and psychological closure) and diagnose predicament 3 (deluded sense of understanding) whenever someone claims to have understanding. More specifically, with regard to a series of stubborn philosophical problems, he argues for the impossibility of *representational understanding* (i.e. cognitive closure) by pointing at our inability to make *sense* of these problems or to grasp their solution (psychological understanding). This, we argue below, does not follow. We might very well find ourselves in predicament 4.

Notice that McGinn is not arguing for our inability to attain a psychological sense of understanding of these philosophical conundrums. Such a psychological grasp would not be hard to come by, since it need not involve genuine cognitive access (predicament 3). McGinn is perfectly aware of this, as is evidenced by his criticism of DIME strategies. A dualist may have a psychological grasp of the mind-body interaction portrayed by dualism, even though the theory is completely wrong. What McGinn is denying, when it comes to these philosophical mysteries, is our ability to come up with a *true* theory. Whenever we grasp a theory about these phenomena, we have stumbled upon a wrong theory, according to McGinn. While this may be the case, the impossibility of psychologically grasping the true theory representing a property P, does not entail (representational) cognitive closure to P. Even supposing McGinn is right that we will never psychologically understand the true scientific theory of consciousness (which, according to McGinn's transcendental naturalism, does exist), it does

not follow that this theory is out of reach. Before we argue why representational closure does not follow from psychological closure, however, we must turn to McGinn's argument and show that it only bears on psychological closure.

4. McGinn's argument

McGinn's transcendental naturalism states that we cannot *reach* the correct scientific answer to certain problems, given the limitations of our particular cognitive faculties (McGinn 1994, 145 – our italics). In support of this representational notion of cognitive closure, however, McGinn (1993) only offers arguments bearing on *psychological* closure to the true theories describing these puzzling phenomena. With regard to the mind-body problem in general, and the emergence of consciousness out of a 'material' brain in particular, McGinn frames the problem in the following terms: "It is thus numbingly difficult to make sense of the fact of material emergence, since nothing plausible suggests itself as an adequate basis for getting consciousness off the ground" (McGinn 1993, 27). He goes on:

Common sense (perhaps augmented with a bit of science) tells us that something is the case, but we have the greatest difficulty in developing a conception of the world that will allow us to accept what common sense tells us. It can then appear that we shall be compelled to revise common sense, on pain of absurdity in our conceptual system, or metaphysical conjuring tricks in objective reality. [...] The head spins in theoretical disarray; no explanatory model suggests itself; bizarre ontologies loom (McGinn 1993, 28).

The symptom is what McGinn calls "philosophical bewilderment", its cause is cognitive closure. From this colorful characterization of our cognitive predicament, it should be clear that McGinn is describing a psychological state of confusion (the "head spins" in disarray, "bizarre" ontologies loom). McGinn's arguments for closure with respect to other philosophical problems are along the same lines. McGinn sets up each of those problems in terms of our intuitive grasp of them and then goes on to show that the mystery cannot be unraveled because we lack the proper faculties (either sensory or cognitive) to do so. In every case, what McGinn is talking about is direct perception or psychological understanding, rather than the process of painstaking discovery and improvements on tentative hypotheses that characterizes science. With regard to the self, McGinn notes that it "appears to be more than merely the body" (1993, 47) and therefore supposedly resists perception-based scientific theories, because "we have no sensory faculty relative to which selves are (immediately) presented as individuated one from another" (48). With regard to meaning, McGinn is struck by the elusiveness of

what he calls “the pretheoretical character” of what we “ordinarily mean by meaning” (1993, 63); and with regard to the notion of free will, which he wants to salvage at any price, McGinn notes that it “cannot be reconciled with any available conception of how the world works” (1993, 79).² Giving up on free will altogether, according to McGinn, would be reverting to the Elimination strategy in the DIME repertoire of responses in the face of philosophical perplexity.

In each and every one of those perplexity-raising cases, McGinn is appealing to our lack of immediate intuitive grasp of these issues. It is a matter of phenomenology rather than epistemology, a matter of psychology rather than knowledge acquisition. What McGinn has established, if anything, is psychological closure in the face of these conundrums, not the representational cognitive closure that his transcendental naturalism aspires to. McGinn has not established that we cannot reach true (scientific) theories about his conundrums.

Take the mind-body problem again, which he treats most extensively. McGinn approaches the problem with a set of crude, intuitive notions such as mind, matter and the elusive mediating level or psycho-physical nexus. There is no talk about neurons, synapses, neural networks or any kind of scientific research into the working of the brain. As Dennett (1991) puts it in his review of McGinn’s book: “One might think, then, that in order to defend a thesis about the outer limits of our powers, one should at least take a peek at the concepts made available to those who have armed themselves with the new technology”. But McGinn doesn’t do so. In fact, he shows no interest at all in scientific enquiry into those problems. This is striking given that McGinn – as opposed to other Mysterians like Nagel (1986) – is firmly convinced that there is a “merely scientific answer” out there (1993, 42). It’s just that we can’t reach it.

McGinn’s arguments not only fail to provide conclusive evidence for his position of transcendental naturalism – they do not even address the issue. His transcendental naturalism explicitly states that “the answer to the mind-body problem consists in a set of *scientific* propositions, not humanly accessible” (1993, 41 – our italics). One would therefore at least expect, as pointed out, that he takes science into consideration to argue for the conclusion that the set of scientific propositions describing the psycho-physical nexus is humanly inaccessible. But he doesn’t.

The deeper reason for this blatant incongruity between arguments and conclusion, we think, is a conflation between the two senses of understanding – psychological and representational understanding. The first, we pointed out, is a matter of the mind connecting with a theory; the second, of a theory connecting with the world. McGinn slips from one notion to the other without noticing. Having

² See also Peter Van Inwagen (1998, 2000) on the issue. Van Inwagen’s influential position is similarly explicitly ‘Mysterian’.

argued that we don't have any chance of acquiring psychological understanding of these elusive problems, McGinn concludes that there is no representational understanding to be had. From an intuitive, commonsense barrier to psychological understanding, McGinn slides into a scientific barrier of representing.

In contrast, we would like to point out that many (perhaps most) good scientific theories have in fact overthrown commonsense, from Newtonian physics, over Darwinian biology, to quantum physics. The barriers set up by our commonsense, which limit the reach of our psychological sense of understanding, have been systematically torn down. So it seems absurd to conclude that no scientific theory could be formulated about the psycho-physical link just because our commonsense cannot grapple with the solution to the problem. Commonsense surely did not stop Einstein in theorizing about the space-time continuum, nor does it stop researchers at the cutting edge of any scientific domain. And there's a good reason for that. Given that most of our commonsense intuitions about the world have an innate basis, and consequently evolved to enable ancestral *Homo sapiens* to deal with a limited set of problems related to their survival and reproduction in the particular ecological niches they inhabited, we should indeed not expect these intuitions to be reliable in tracking scientific truths concerned with the fundamental structures of the world (see Vlerick 2012; Vlerick and Broadbent 2015).³

Moreover, given that intuition and commonsense are poor tools to deal with scientific answers to certain problems, they can be expected to be equally poorly suited for framing the problems themselves (Kriegel 2003). What guarantee do we have that the intuitive description of those philosophical conundrums is in any way an accurate description of the relevant properties in the world? Perhaps the quest for a natural principle that explains the emergence of mind from matter is akin to explaining how an eternal soul enters and leaves a mortal body. There is a good reason why no naturalistic explanation should be expected for the latter, namely that the statement of the problem is utterly flawed. It doesn't correspond to any real feature in the world. In any case, whether or not any of those elusive philosophical problems actually correspond to real-world phenomena – rather than being phantom problems concocted by overly imaginative minds disoriented by misleading intuitions – McGinn's argument for closure based on their "eeriness" (1989, 349) is flawed. To establish (representational) cognitive closure, it should be demonstrated that a problem is closed to actual scientific research as well all possible future science (since cognitive closure is not a factual but a principled matter) (Vlerick 2014). McGinn establishes neither.

³ Interestingly, McGinn has no problem with granting us cognitive access with regard to extremely counterintuitive theories in modern physics, which goes to show again that the way he frames cognitive access is in a purely representational way.

5. *Why psychological closure is irrelevant to normative closure*

At this point, we've established that psychological and representational understanding are two very different things and that the one does not entail the other. A great quote, attributed to the late Richard Feynman, nicely teases apart these two notions: "if you think you understand quantum mechanics [i.e. if you have psychological understanding of QM], you don't understand quantum mechanics [you don't have representational access to QM – assuming that QM provides us with a true theory of the world]". In other words: if you have the feeling that you intuitively 'grasp' quantum phenomena, you must have adopted a distorted or inaccurate representation of them, as quantum phenomena are not accessible to psychological understanding. Anyone who 'understands' them psychologically, doesn't understand them representationally. The reason why psychological understanding is irrelevant in determining representational access – and that therefore representational closure does not follow from psychological closure – is that psychological understanding is both too weak and too strong a criterion.

The fact that it is too weak stands to reason and is empirically confirmed. The history of science is filled with cases that fall under cognitive predicament 3. Many false theories about certain properties were once widely accepted and properly understood given their intuitive plausibility (e.g. Aristotelian physics and Ptolemaic astronomy). From small discoveries to radical paradigm shifts, such as the Newtonian, Copernican and Darwinian revolutions, theories that were once regarded as true representations of the world – even as unquestionable and obvious – have been discarded in favor of new, better theories. In all these cases, in retrospect, we can now state that a psychological understanding – having a correct grasp of a theory T describing a property P – did not amount to representational understanding, since theory T did not represent P truthfully.

Interestingly, the core value of modern science is to refrain from taking psychological understanding as evidence for truth. Indeed, if anything characterizes science, it is the imperative not to accept any theory or hypothesis at face value, however likely or plausible it seems. Science invites doubt about even our best theories. If psychological understanding were our guiding principle – if all that mattered was that theories about the world made psychological sense to us – we would have been stuck with geo-centrism, Aristotelian physics, and essentialism in biology. For the sake of knowledge, luckily we have not.

The fact that we sometimes find ourselves in predicament 3 is rather obvious and is acknowledged by McGinn. What McGinn overlooks is the possibility of predicament 4 (representational access but psychological closure). The point we press against McGinn is that psychological understanding is also *too strong* a

criterion for representational understanding. We could indeed very well have representational access to some property of the world (i.e. possess an accurate scientific explanation and/or model), without grasping these representations on a psychological level. In other words, it is possible for human beings to devise theories that connect with the world even though our psychological sense of understanding fails to connect to the theory.

As Trout points out, “the occurrence of this [psychological] sense or feeling of understanding is *neither necessary* nor sufficient for good explanation [representational understanding]” (Trout 2002, 213 – our italics). The scientist finding herself in predicament 4 would have an accurate understanding of the object of her study, but she would not be endowed with a psychological sense of grasping it. Much in the same way that a mathematician can represent infinity and handle it with equations, while struggling to grasp what infinite space or time is like, our scientist might be able to theorize (correctly) about a property of the world without grasping what it is like or how it can exist.

Note, in this regard, that psychological understanding does *not* amount to a subjective assessment of representational understanding. While being endowed with a psychological understanding of a theory T describing a property P, often – and sometimes falsely – leads one to infer representational understanding of that property P, the critical thinker may very well suspend such an assessment of representational understanding. She could do so precisely because she knows psychological understanding (grasping T) to be a poor predictor of representational understanding (theory T representing P truthfully). Conversely, our critical thinker may have no psychological understanding of theory T, but nevertheless assess that T is in fact correct (i.e. representational access), based on the fact that it came about through reliable and thorough scientific inquiry and testing. She would in that case consider herself to be in cognitive predicament 4.

Take, for example, the notion of quantum superposition, according to which a particle can be at two locations at the same time. The extremely counterintuitive nature of such a theory makes it a good candidate for psychological closure (at least when in conjunction with representational access, as Feynman’s quote suggests). Be that as it may, even if we would be psychologically closed to this aspect of quantum physics – meaning that we could never ‘grasp’ it – we would not be representationally closed to the properties QM is describing. At least not if the theory is correct (in its broad outlines).⁴ Nothing indeed would prevent us from making use of Schrödinger equations and describing the behavior of subatomic particles accurately. This would amount to having access to a property P, but lacking the subjective feeling of understanding the theory T describing P.

⁴ Of course our assessment of the correctness of the theory would always be fallible and provisional.

What is required for representational understanding is that our network of representations is conceptually linked with the relevant state of the world, and that it forms a coherent ‘interconnected network of commitments that suitably bear on the relevant facts’ (Elgin 2012). Whatever psychological state accompanies this cognitive feat is irrelevant in terms of representational access.

Given that psychological understanding is neither a necessary condition for representational understanding (too strong), nor a sufficient condition (too weak), it is, in every sense, insignificant with regard to the issue of cognitive closure. Whether or not a psychological grasp accompanies our representation of a property is irrelevant as far as the question of representational understanding is concerned. Cognitive access is determined by the relation between a representation (or set of representations) and the world, not by the relation between a representation and a mental state.

Our cognitive nature, however, systematically leads us astray. Not only are we often too quick in thinking we understand something (representational understanding), just because a theory ‘clicks’ (is psychologically grasped), we are also prone to thinking that a theory needs to click in order to *be* correct. But, as argued above, psychological understanding is not (strongly) correlated with representational understanding. We should therefore leave our intuitions out of epistemology. McGinn does not do this, and this is where his argument goes wrong.

This is not to say that the limits of psychological understanding are entirely uninteresting. Much as a perceptual illusion won’t go away even after rationally assessing that our perception is distorted (e.g. by measuring the two lines in a Müller-Lyer illusion), so too might our minds continue to find certain theories unpalatable, condemning us to cognitive predicament 4 instead of 1. Nevertheless, whether or not we face unsurmountable barriers to psychological understanding in scientific inquiry, psychological closure does not affect the prospects of scientific understanding in any meaningful way. Indeed, psychological resistance to ‘grasping’ a theory does not prevent scientific knowledge, nor does it decrease the likelihood of such a theory being true.

Moreover, we should not be too pessimistic about the prospects of psychologically understanding *prima facie* puzzling phenomena and counterintuitive theories. Dennett (2013), in this regard, suggests that we can and should stretch and expand the reach of our intuitive grasp, by means of so-called ‘intuition pumps’. And McCauley offers a promising historical perspective to the question of the counterintuitive nature of science:

when first advanced, the suggestions that the earth moves, that microscopic organisms can kill human beings, and that solid objects are mostly empty space were no less contrary to intuition and commonsense than the most counterintuitive consequences of quantum mechanics (McCauley 2000, 69).

In any case, if there is one conclusion to be drawn after five centuries of scientific inquiry, it is that the world does not in any way conform to our intuitive expectations.

6. Conclusion

McGinn's transcendental naturalism depends on a representational notion of cognitive closure. The arguments he produces in favor of representational closure, however, miss the mark. They only bear on psychological closure. Contra McGinn, we argue that it is a mistake to think that representational understanding is necessarily accompanied by psychological understanding. By making the distinction between representational and psychological understanding explicit and showing how representational understanding does not require psychological understanding, we show that McGinn's case for cognitive closure is unwarranted.⁵ The larger morale, as we see it, is that armchair philosophy – with its excessive reliance on intuition – is unequipped to deal with problems having naturalistic (scientific) solutions. Scientific progress in explaining natural facts cannot happen from the philosopher's armchair, and neither can an assessment of the limits of such progress.

Is the error of conflating representational and psychological understanding another trap set up by our own cognitive wiring? The polysemous nature of the concept 'understanding' suggests as much and explains McGinn's mistake. Our hope is that this paper contributes to keeping these two notions apart and, in doing so, improves our thinking about the limits of science in particular and human knowledge in general. Scientists should be wary of the distorting effects of intuitive thinking on scientific research (see De Cruz and De Smedt 2007), but they should also take heart in the fact that, no matter how far removed they find themselves from commonsense and from our intuitive reach, there is no principled reason why knowledge cannot be advanced and Chomskyan mysteries removed.

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⁵ This, of course, does not mean that we have established that the human mind is not cognitively closed to any aspect or property of the world (including those aspects that McGinn singles out), merely that McGinn's argument for closure misfires.

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