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Two construals of Hempel's dilemma: a challenge to physicalism, not dualism

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Abstract
In a recent paper, Firt, Hemmo and Shenker argue that Hempel's dilemma, typically thought to primarily undermine physicalism, is generalizable and impacts mind-body dualism and many other theories equally. I challenge this view and argue that Hempel's dilemma admits of at least two distinct construals: a general-skeptical construal, underpinned by historically driven arguments such as the pessimistic induction, and a non-skeptical construal, driven by the specific puzzles and volatility of current physics. While the general-skeptical construal applies to all changeable deep-structure theories, the non-skeptical construal primarily targets volatile theories which harbor exclusionary ambitions. As a result, dualism largely evades both construals due to the stability of theories of the mental and their lack of exclusionary ambitions. Conversely, physicalism is uniquely susceptible to both construals due to its strong commitment to deep-structure realism, inherent exclusionary ambitions, and the volatility of certain branches of fundamental physics. The paper ultimately concludes that Hempel's dilemma is not universally problematic, but presents a unique challenge to physicalism while being relatively congenial to dualism.

Keywords Hempel's dilemma · Physicalism · Dualism

1 Introduction

According to physicalism all properties are either physical properties, or are metaphysically necessitated by physical properties. Most contemporary physicalists tend to dismiss a-priori characterizations of physical properties, opting instead to rely on physical science; physical properties are simply the properties postulated by physical

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science. However, this dependence on theory has emerged as a weakness of physicalism, famously exploited by Hempel (1980, 194–195):

> I would add that the physicalistic claim that the language of physics can serve as a unitary language of science is inherently obscure: The language of what physics is meant? Surely not that of, say, 18th century physics; for it contains terms like 'caloric fluid', whose use is governed by theoretical assumptions now thought false. Nor can the language of contemporary physics claim the role of unitary language, since it will no doubt undergo further changes, too.

Appealing to future physics is equally futile, as the properties postulated by such physics are largely unknown to us. For all we know they might include mental properties or other ostensibly non-fundamental properties, which would render physicalism vacuous or trivially true (Crane & Mellor, 1990, 188). Consequently, physicalism is either false (if physical properties are determined by current physics) or vacuous/trivially true (if physical properties are determined by future physics). This argument, widely known as 'Hempel's dilemma', has generated a substantial body of literature[1]. In this literature, Hempel's dilemma is generally perceived as a challenge specifically to physicalism. Erez Firt et al. disagree:

> …to the extent that Hempel's Dilemma applies to physicalism it equally applies to any theory that attempts to give a deep-structure and changeable account of our experience. In particular, we will argue that Hempel's Dilemma applies not only to physicalism, but and to the same extent to mind–body dualistic theories, provided the latter attempt to give a deep-structure account of our experience. Our conclusion is that the scope of Hempel's Dilemma turns out to be much wider than usually thought: the Dilemma is a special case of a general sceptical argument against deep structure and changeable theories in and outside science (Erez Firt et al., 2022, 3).

Erez Firt et al. explicate the concept of "deep structure theories" by drawing on Einstein's distinction between 'constructive theories' and 'principle theories'.[2] Principle theories are well confirmed systematizations of empirical generalizations, whereas constructive theories postulate theoretical entities that are meant to explain the generalizations comprising principle theories (Howard & Giovanelli, 1019, § 6). Thermodynamics is a prime example of a principle theory, while statistical mechanics – providing a hypothesized theoretical foundation for the empirical generalizations of the former – exemplifies a constructive theory. Erez Firt et al. consider constructive theories as mere exemplifications of deep structure theories, consciously refraining from committing to any explicit general account of such theories. Erez Firt et al. further contend that many theories, including mind-body dualistic theories, fall under the category of changeable deep structure theories. As such, they are susceptible to a generalized version of Hempel's dilemma: current changeable deep-structure

[1] Erez Firt et al. (2022) canvass this literature in Sect. 2.3.

[2] This distinction is developed in Einstein (1919).

theories are most likely false, whereas their successors are largely unknown. Consequently, Hempel's dilemma surfaces as a nearly universal problem, a broad skeptical argument, rather than a unique challenge exclusive for physicalism as it is commonly construed. I will argue that Erez Firt et al. overstate the scope of Hempel's dilemma, but I won't delve much into the details of their argument, as my main aims are more general in nature. Firstly, I aim to delineate the underlying motivations of Hempel's dilemma. Secondly, my broader goal is to establish that once the dilemma and its motivations are properly outlined, it emerges as relatively unthreatening towards dualism and, conversely, uniquely vexing for physicalism. Erez Firt et al.'s work serves as a context for this general discussion.

2 Two construals of Hempel's dilemma

At least two distinct construals of the dilemma emerge from the literature: a general skeptical construal and a non-skeptical construal based on the particulars of current physics. This section introduces both construals, followed by an assessment of their implications for the generalizability of Hempel's dilemma in the next section. The different construals set the horns of the dilemma on entirely distinct philosophical grounds. In other words, each construal provides quite different justifications for the following claims:

First Horn [FH]: current physics is most likely false.

Second Horn [SH]: future physics is unfit for physicalist purposes (it renders physicalism vacuous, trivially true, etc.).

Start with the general-skeptical construal of the dilemma.

2.1 The general-skeptical Construal of Hempel's dilemma

According to this construal, FH is true due to general skeptical considerations or principles of scientific rationality. The former assumes that scientific theories are most likely false, whereas the latter, more modest position, advises against endorsing the truth of any scientific theory. In both scenarios, current physics is considered likely false (or not true) not due to its specific characteristics, but due to general skeptical and epistemic considerations. Consider first the general-skeptical justification of FH concisely articulated by Pineda (2006, 245):

> Now, if we take the first horn of the dilemma, the difficulty is that since current physical theories, like all other empirical theories, will most probably turn out to be false, physicalism interpreted in this way will most likely be false, too. But then it is absurd to believe in a thesis we know will most likely be false.

Although not explicitly stated by Pineda, the likely falsehood of all current empirical theories is typically supported by a straightforward inductive argument, commonly

known as the pessimistic induction[3]: Since all past empirical theories turned out to be false, it is likely that all current empirical theories are false as well. Regardless of the specific argument used to justify this general-skeptical claim, a general-skeptical claim it remains: current physics is likely false not due to any of its particular characteristics, but due to sweeping skepticism. Melnyk (1997, 624) offers a somewhat narrower inductive argument in support of FH:

> Past theories of physics, when judged from the standpoint of current physics, have usually turned out to be both false and incomplete, it is therefore very likely (though not, of course, absolutely certain), that current physics is both false and incomplete[4].

Much like the general pessimistic induction, this argument establishes FH not by relying on the specific characteristics of current physics, but rather through skeptical concerns rooted in the history of science. These concerns are entirely general, and apply indiscriminately to all physical theories– irrespective of their status and perceived scientific standing. Montero (1999) argues that even a *seemingly* mature and nearly complete physical theory - one ostensibly devoid of foundational gaps and conceptual inconsistencies – succumbs to FH and fails to substantiate physicalism, as demonstrated by late 19th century physics. A slightly different yet related justification of FH appeals to general principles of scientific rationality. For instance, according to Van Fraassen (1996, 175):

> … There is no empirical claim which may not be contradicted by the eventual content (product) of science. Therefore, to accept the scientific enterprise at all, as one of rational inquiry to which we are committed, is to adopt an attitude of detachment with respect to any and all empirical claims. All such claims are to be readily surrendered as hostages to the fortunes of future experience. Therefore, it seems to me that they cannot and should not be part of any philosophical position. This goes for 'materialist' theses, but also of course, for 'anti-materialist' theses, whether about psychological functioning, physiological evolution or conservation of matter/energy.

And

> This implies for every empirical thesis the prospect of being given up eventually, however well-grounded it may be in present science (Van Fraassen, 1996, p. 173).

Scientific inquiry requires a detached stance that is fundamentally incompatible with affirming the truth of any specific scientific theory. As Van Fraassen highlights, the scope of this claim is quite general, transcending the particulars of any individual scientific theory. Chomsky (1988), Crook and Gillette (2001) and Poland (2003) offer

[3] First proposed by Laudan (1981).

[4] Montero (1999) and Dowell (2006) endorse similar arguments.

similar justifications in support of FH. SH can be justified by the same general skeptical and epistemic considerations that substantiate FH. First, the pessimistic induction extends from current to future physics, since future physics will eventually become the "current physics" of a certain period, and, according to the pessimistic induction, it too will follow a long succession of discarded physical theories. Secondly, the spirit of detachment extolled by Van Fraassen is presumably dictated by the very nature of scientific theorizing; consequently, this detached perspective should apply equally to future scientific theories as it does to current ones. SH appears to be superfluous now – we are left not with a two-pronged dilemma, but with a reinforcement of a single horned argument: physics and scientific theories in general are either false or should not be endorsed as true. Consequently, future physics becomes unsuitable for physicalist purposes for the same reasons as current physics – both are either false or should not be endorsed as true. Typically, the threat posed by SH is considered to be more nuanced: even if future physics is both true and complete it may still fail to deliver an interesting and non-trivial concept of the physical. One possible way for a general-skeptical construal of the dilemma to accommodate such a reading of SH, involves an induction not from the falsehood of past physical theories, but from the conceptual upheaval they underwent. Just as the entities postulated by current physics dramatically differ from those of past physics, so too will the postulated entities of future physics differ from those of the present. The entities that future physics might postulate could encompass virtually anything – including fundamental mental properties[5]. This renders future physics unsuitable for physicalist purposes, even if it is both true and complete. Whether this construal preserves the dialectical structure of a proper dilemma - composed of at least two distinct horns, falls outside the scope of this paper. For our purposes it should only be noted that this understanding of the dilemma - much like the previous ones – does not appeal to the specific problems and lacunae of current physics, but to general historically-grounded considerations. Let's now move to consider the non-general construal of dilemma.

2.2 The non-skeptical construal of Hempel's dilemma

According to Smart Hempel's dilemma fails for the following reason:

> If it be granted that the physicalist is right in identifying mind and brain, and if it be granted that the brain is essentially a nerve net, then physics enters our understanding of the mind by way of the biochemistry and the biophysics of neurons. But neurons are, in Feinberg's sense, "ordinary matter". So whatever revolutionary changes occur in physics there will be no important lesson for the mind-body problem (1978, 340).

Physicalism can be formulated in terms of current physics without dispute, since the very same domains of current physics that are very nearly true and complete are the ones most relevant to the mind-body problem (the domains of "ordinary matter"). Call this The Ordinary Matter Reply to Hempel's dilemma, also endorsed by Lewis

[5] Chomsky (1988) and Poland (2003) propose an argument along these lines.

(1994) and Bokulich (2011). The Ordinary Matter Reply implicitly interprets Hempel's dilemma in non-general and non-skeptical terms: it presumes that the dilemma only applies to those domains of current physics that are in rapid flux and plagued by foundational lacunae and conceptual conundrums. On the other hand, the dilemma does not apply to stable and well-understood domains such as those dealing with ordinary matter. Therefore, The Ordinary Matter Reply is incompatible with a sweeping skeptical stance, like the one driven by the pessimistic induction, since such a stance threatens to undermine even the most seemingly stable scientific theories. Accordingly, the ordinary Matter Reply construes FH in terms of the particular details of current physics – current physics is justifiably deemed false and incomplete only to the extent that it is deficient and unstable. However, some domains of current physics (not to mention other sciences) are nearly complete and remarkably stable. Erez Firt et al. are also inclined towards a current-physics-based construal of FH – they argue that, given the plethora of foundational disputes and puzzles it faces, current physics is very likely false and incomplete (Erez Firt et al. outline some of these disputes in Sect. 3.2). However, diverging from the Ordinary Matter Reply, Erez Firt et al. maintain that for all we know, the anticipated radical changes in physics that these problems will inevitably induce, could have enormous relevance to the mind-body problem:

> In von Neumann's (1932) standard formulation of quantum mechanics, which is our best contemporary fundamental framework of quantum field theory, the mental is an indispensable part of the physical theory: that is, the 'observer's mental states' at the end of the measurement chain of interactions introduced explicitly by von Neumann are the ultimate empirical justification as well theoretical justification (according to von Neumann, 1932) for the so-called projection postulate, where the fact of the matter is that without the projection postulate standard quantum mechanics has no empirical content whatsoever. This is just part of the so-called quantum measurement problem. Some of the interpretations of quantum mechanics propose the conjecture that the collapse of the quantum state is triggered by the mind (e.g. Chalmers and McQueen, forthcoming), and that quantum superpositions in the brain may be relevant for understanding the nature of the mind (e.g. Hameroff & Penrose, 2014). So regardless of whether one seeks a pure physicalist or a straightforward dualist account of the observer in quantum mechanics, given the present state of the art, it seems quite immature to say that a deeper understanding of quantum mechanics is unlikely to be relevant to philosophy of mind. The truth is that we don't really know (2022, 10).

According to Erez Firt et al., changes related to the contested and unstable aspects of current physics, such as various possible solutions to the measurement problem, could influence the seemingly stable aspects of current physics, including those pertaining to brains and ordinary matter. These changes could even threaten to trivialize

physicalism by incorporating mental and other ostensibly non-fundamental properties[6]. Consequently, SH is also untenable for the physicalist.

3 The generalizability of the skeptical construal of Hempel's dilemma

As observed, the general construal is predominantly motivated by historically driven arguments, such as the pessimistic induction. This construal is generalizable to changeable deep-structure theories, since it is precisely these theories, with their postulated theoretical entities (e.g. statistical mechanics), that are targeted by the pessimistic induction. They have been repeatedly falsified throughout the history of science, leading us to anticipate the same fate for current deep-structure theories. Therefore, if Hempel's dilemma is construed in general-skeptical terms, it extends across all changeable deep structure theories, precisely as Erez Firt et al. argue. However, as Erez Firt et al. note, even a generalized dilemma does not threaten the purely observable entities and generalizations that comprise principle theories. Consider, for example, the observable regularities of thermodynamics: when a liquid is heated its temperature rises, it boils and subsequently undergoes a phase transition into a gas. Such regularities remain untouched by a generalized skeptical dilemma: only unobservable entities fall within its scope. This is because only unobservable entities display a historical pattern of falsification and replacement by new unobservable theoretical entities. This historical pattern of falsification underpins the skeptical construal of the dilemma and limits its scope. Observable entities and processes, such as expanding gasses and cooling liquids, fall outside this range - they are, 'foundationally secure', to paraphrase Einstein (1919). They are facts that we must explain, not explanatory constructs we may replace, to paraphrase Chalmers (1996). This should not be taken to imply that principle theories as a whole are immune to significant shifts, as Erez Firt et al. observe:

> It is important to notice that while thermodynamics is very strongly supported by experience, its entities and properties and laws are theoretical ones, far richer in their contents than mere generalisation from experience. As in Sect. 3.1, we stress here that the history of science teaches us that all theories can change (2022, 19).

Undoubtedly, the theoretical aspects of thermodynamics are subject to change and even wholesale replacement. However, the observable phenomena thermodynamics investigates – such as boiling water and expanding gasses – are not subject to such instability, especially not based on general skeptical grounds. If mental states, such as felt pains and anxiety, are also non-theoretical—akin to ordinary observable phe-

[6] Hempel (1969) argues that current physics is a significant distance away from accomplishing the conceptual reduction of less fundamental disciplines hoped for by many of his contemporaries. As such, reductionist physicalism *itself* entails that physics must undergo radical change. However, these anticipated radical changes threaten to render physicalism vacuous.

nomena—then they too remain outside the domain affected by the general skepticism prompted by the pessimistic induction. This viewpoint is echoed by both Chalmers and Searle, who suggest that mental states are indeed of this nature:

> Consciousness is not an explanatory construct, postulated to help explain behavior or events in the world. Rather, it is a brute explanandum, a phenomenon in its own right that is in need of explanation. (Chalmers, 1996, p. 188).

> Where consciousness is concerned the existence of the appearance is the reality. If it seems to me exactly as if I am having conscious experiences, then I am having conscious experiences. (Searle, 1997, p. 112).

Erez Firt et al. reject this position for the following reason:

> However, as we know from the philosophy of science and other branches of inquiry, many and arguably all statements about phenomena are theory laden (see considerations and references in Bogen, 2017). This includes statements about the mental realm, and in particular, statements based on first-person reports about mental experience (2022, 14).

This strikes me as a hasty conclusion. Given that arguably all statements about observable phenomena are theory-laden, if being theory-laden disqualifies a statement from describing an observable phenomenon and being part of a principle theory, then principle theories and statements describing observable phenomena wouldn't exist. Yet, they clearly do. In other words, to maintain the distinction between deep-structure theories and principle theories, and between observable phenomena and unobservable phenomena, we must acknowledge that some theory-laden statements and phenomena are nonetheless observable and can be part of a principle theory. The theory ladenness of stars, pendulums and tables, is not equivalent the theory ladenness of quarks and Higgs Bosons. Statements about the former are potentially theory-laden statements about observable phenomena, while statements about the latter are essentially theory-laden statements about unobservable phenomena. According to Chalmers and Searle, mental properties do not belong to the latter category and are, at the very least, closely akin to properties that belong to the former category. Mental properties figure in folk theories and explanations by being systematically correlated with each other and with actions and behaviors: he jumped because he felt a sharp pain; she opened the door because she believed someone was on the other side. According to Chalmers and Searle, these are principle mind-body explanations: both the explananda and explanantia comprise brute empirical data—facts to be explained—such as sensations of pains and the movements of hands, which are not unlike warm liquids and expanding gases. As such, mental properties fall outside the scope of a general-skeptical construal of Hempel's dilemma. Unaffected by the turbulent history of deep-structure theories, they are both ontologically and conceptually secure. Note that I do not need to commit here to the potentially contentious claim that mental states, such as stomach aches and foot itches, are literally observable phenomena akin to rocks and liquids. To safeguard these mental states from the threat of general scien-

tific skepticism, it is sufficient to establish that, in terms of their relationship to scientific theories, mental states bear a much closer resemblance to rocks and liquids than to quarks and magnetic fields. The latter, but not the former, serve as postulates in scientific theories aimed at explaining everyday phenomena. Conversely, the former, but not the latter, constitute the very realm of everyday phenomena—the manifest image—that quarks and magnetic fields are invoked to scientifically explain. Since historically driven scientific skepticism exclusively targets entities of the latter sort, such as quarks and magnetic fields, mental states (as well as rocks and liquids) remain beyond its reach. This assertion holds true irrespective of whether mental states are strictly observable. Some reject this picture[7], and suggest that mental properties are merely theoretical constructs, not on par with bona-fide observable phenomena like tables and liquids. Consequently, theories comprised by mental properties are deep-structure theories whose primary aim is to explain human behavior and action. Like all other deep-structure theories, their eventual falsification seems imminent, at least according to historically driven skeptical considerations. Thus, if mental properties are mere constructs, a skeptical-general construal of Hempel's dilemma would apply to mental properties and the theories comprised by them. This view of the mental as a mere construct has the resources to dissolve its initial patina of implausibility. For example, our mental vocabulary has been embedded in our theory of reality for millennia. Therefore, it should come as no surprise that the theory-ladenness of this deeply ingrained vocabulary is invisible to us. The result is an apparent but false affinity between truly directly observable phenomena such as rocks and billiard balls, and the deeply disguised theoretical constructs that populate folk psychology[8]. Since such arguments and the theory-observation distinction more generally call for a thorough treatment and much philosophical scrutiny, engaging with these questions falls outside the scope of this paper. Accordingly, I prefer to mostly sidestep the issue and frame the claim conditionally: if mental states are not theoretical constructs (and are on par with other directly observable phenomena), then the dualist has the resources to avoid the first construal of the dilemma (in the form of principle theories of the mental such as folk psychology) [9]. In this context, it should be noted that the notion that mental properties are mere constructs conflicts with traditional physicalist commitments. Most physicalists view mental properties as grounded in, or reducible to, physical properties[10]. As such, mental properties cannot be mere constructs. Physics, as a deep-structure theory, encompasses all phenomena, including mental phenomena. In other words, statements about mental phenomena form the principle theory, while physics serves as the deep-structure theory. Consequently, the theoretical elimination of mental phenomena is unappealing to most physicalists, both reductionists and non-reductionists alike. If mental properties are not theoretical constructs

[7] For instance: Churchland (1981), Frankish (2017) and Dennett (2018).

[8] The alleged direct observability of our mental states is also challenged on empirical grounds, as some experimental results cast doubt on the reliability of our self-ascribed mental states. For more, see Shenker (2020).

[9] I thank an anonymous referee of this journal for bringing this issue to my attention.

[10] The premier argument for physicalism, the argument from causal closure, hinges on the assumption that mental events are immediately perceivable and causally efficacious. See Stoljar (2001a, § 6).

awaiting elimination, as entailed by traditional physicalist picture, then dualists possess the resources to derive a stable concept of the mental from a principle theory like folk psychology[11]. In other words, folk theories of the mental provide us with a notion of the mental that is unthreatened by the general-skeptical dilemma[12]. Skepticism concerning the theoretical constructs of deep-structure theories does not imply skepticism about the sensation of pain or my desire to win the lottery, any more then skepticism regarding quarks and leptons entails skepticism about rocks and trees. The latter types of entities are simply impervious to the type of skepticism induced by the pessimistic induction. Such skepticism would naturally dismiss any claims suggesting that we cannot know the true nature of phenomena like pains and trees, without knowing their microphysical 'deep-structure'. The driving principle behind the pessimistic-induction based skeptical endeavor is that the non-theoretical should be held in greater epistemic regard than the theoretical. The former are ordinary facts and phenomena, stable, secure and mostly directly perceivable. The latter are helpful or empirically adequate constructs or instruments, to which we must not become too ontologically attached. Consequently, a skeptical-general Hempelian dilemma is particularly damaging to physicalism, since according to Erez Firt et al., physicalism places great epistemic stock in deep-structure theories:

> We know what is mental only on the assumption that physicalism (or some other deep structure theory) is false; that is, if we deny in advance that the mental is, for example, physical! After all, according to physicalism, we don't actually know what the mental is, this is the whole point of physicalism as a specific deep-structure approach to the mind (2022, 13).

However, if one embraces wholesale skepticism regarding deep-structure theories, it implies that our understanding of mental phenomena cannot be dependent on deep-structure knowledge. This is because, according to this skeptic, the postulates of deep structure theories fail to reveal the deep-structure of mental phenomena, or indeed, any other phenomena. Dualism is perfectly compatible with this type of deep-structure skepticism: if mental phenomena are on par with other non-theoretical empirical phenomena, then our knowledge of the mental realm is independent of the veracity of physicalism. This is similar to how we can comprehend what trees and rocks are, independent of the truth of the underlying deep structure physical theories of trees and rocks. This skeptical-friendly dualism essentially posits that ordinary mental phenomena are not identical to, or metaphysically grounded by, physical phenomena, whether observable or otherwise. The dualist also has the freedom to recognize the epistemic import of deep-structure theories and reject deep-structure skepticism. However, this inevitably exposes her to a general-skeptical Hempelian dilemma (as I argue below). The key point here is that the dualist has much more wiggle room

[11] Most scientific branches of psychology can also be considered principle theories, insofar as they strive to uncover patterns and regularities governing "ordinary" mental states and behaviors.

[12] Note that I do not assert that folk psychology is inherently a dualistic theory (whatever that assertion implies). Instead, I argue that folk psychology equips the dualist with the necessary vocabulary to articulate their position in a manner that remains impervious to the challenges posed by historically driven scientific skepticism.

than the physicalist, given that dualism is not as strongly tethered to deep-structures as physicalism is[13]. Can't the physicalist avoid resorting to deep structure, thereby shielding herself from the dilemma by simply characterizing the physical in terms of observable non-theoretical phenomena like rocks and trees[14]? She certainly can and some have indeed chosen this path[15]. However, many physicalists are often reluctant to employ this strategy, for reasons famously delineated by Crane and Mellor:

> But physicalism differs significantly from its materialist ancestors. In its seventeenth – century form of mechanism, for instance, materialism was a metaphysical doctrine: it attempted to limit physics a-priori by requiring matter to be solid, inert, impenetrable and conserved, and to interact deterministically and only on contact. But as it has subsequently developed, physics has shown this conception of matter to be wrong in almost every respect: the 'matter' of modern physics is not all solid, or inert, or impenetrable, or conserved; and it interacts indeterministically and arguably sometimes at a distance. Faced with these discoveries, materialism's modern descendants have—understandably—lost their metaphysical nerve. No longer trying to limit the matter of physics a-priori, they now take a more subservient attitude: the empirical world, they claim, contains just what a true complete physical science would say it contains (1990, 186).

The physicalist, therefore, finds herself in unique historical circumstances, which all but compel her to characterize the physical not in terms of observable physical phenomena, but in terms of deep-structure theories. The result is a sort of meta-dilemma for the physicalist: either characterize the physical in terms of observable physical phenomena, thereby avoiding Hempel's dilemma but at the cost of detaching physicalism from physical theory; or characterize the physical in terms of physical theory, thereby upholding the anti a-priori sentiment at the heart of physicalism, but at the risk of entanglement in Hempel's dilemma. No such predicament confronts the dualist. Lastly, an important caveat is in order. As observed by Erez Firt et al., some dualist theories take the form of deep-structure explanations, couched in current physics and neuroscience. Consequently, a distinction must be drawn between principle and deep-structure dualist theories[16]. Examples of the latter include Hameroff and Penrose (2014), Chalmers and McQueen (2023), and more controversially, Tononi (2004). I

[13] This should not be taken to imply that reduced theories are necessarily empirical or non-theoretical. Undoubtedly, some non-fundamental theories include numerous theoretical postulates, which, in turn, aim to further reduce or explain even less-fundamental theories. My claim, however, is specifically limited to ordinary mental states and the theories that systematize them, such as folk psychology. If the eliminativist materialist is wrong, then the entities populating these theories are immune to historically driven scientific skepticism as rocks and trees.

[14] Building on Montero (1999), Erez Firt et al. suggest that identifying states such as pain as paradigmatically mental is tantamount to assuming that pain is not physical. I disagree: if physicalism is true, pain is both paradigmatically mental and fundamentally physical, just as alkaline phosphatase is both paradigmatically biological and (presumably) fundamentally physical.

[15] For example: Jackson (1998); Stoljar (2001b).

[16] I thank anonymous referees of this journal for bringing this distinction and the ensuing discussion to my attention.

concede that these approaches are vulnerable to the first construal of the dilemma: being deep-structure theories, they are incompatible with historically driven general skepticism. Similar considerations may apply to currently less-favored dualistic theories seeking to explain ordinary mental phenomena in terms of some hypothesized non-material entity, such as souls, spirits or thinking substances. While such theories are not properly 'scientific', they encumber the dualist with an unobservable deep-structure. Accordingly, my argument is best understood as a defense of variations of principle dualism that reject deep-structure explanations: be it due to general skeptical arguments, or due to a view of the mental as fundamentally autonomous and incongruous with deep-structure explanations derived from the physical sciences[17]. Only such dualistic theories remain unaffected by the first construal of the dilemma. Such variations of dualism are subject to criticism on the grounds that they are non-explanatory: they do not offer much more than a systematization of ordinary mental phenomena, while both physicalism and deep-structure dualism attempt to ground and integrate these phenomena into our scientific worldview. While this criticism of deep-structure eschewing theories might be justified, it will not impress the deep-structure skeptic. The deep-structure skeptic rejects the ontological significance of deep-structure accounts and, accordingly, will not criticize dualist theories for lacking the deep structure she views as mostly chimerical and of mere instrumental value. The point I wish to stress is not that such a skeptic is right, but rather that the dualist can consistently choose to adopt such skepticism and remain unharmed by the first construal of the dilemma, whereas the physicalist cannot employ the same strategy. Let's summarize: firstly, if folk theories of the mental are principle theories (and mental concepts are on par with empirical non-theoretical concepts), then the dualist can draw a dilemma-immune concept of the mental from these theories. Secondly, unlike the physicalist, the dualist need not be committed to deep-structure realism and can therefore entertain deep-structure skepticism, thus avoiding the brunt of the dilemma. Lastly, unlike the physicalist, the dualist is not bound by an anti a-priori mandate, and can therefore characterize the mental in terms of non-scientific exemplars drawn from principle theories of the mental. What emerges is a thoroughgoing discrepancy between dualism and physicalism in the face of a general skeptical dilemma – the physicalist is uniquely vulnerable, and has far fewer options of responding to, or co-existing with, a general skeptical dilemma compared to her dualist counterpart.

4 The generalizability of the non-skeptical construal of Hempel's dilemma

The second, non-skeptical construal of the dilemma is driven by the unique challenges faced by current physics (the first horn), and the radical shifts to physics any resolution of these challenges will undoubtedly provoke (the second horn). In other words, the likely falsehood of current physics is attributed to the specific problems it contends with, rather than a sweeping scientific skepticism. Erez Firt et al. propose that all sciences are comparably unstable:

[17] See for instance Child (1992).

> Physics is by no means the only theory that underwent radical changes in the twentieth century, and moreover that is conjectured to change further in the future. Yet, the more the entities and properties (etc.) of a given theory are close to (what many take to be) directly observable (i.e. non-theory-laden facts, if there are such facts), the more people may reasonably tend to conjecture that these theories will not undergo substantial change, and so the less these theories are subject to Hempel's Dilemma, given requirement 2. However, one important lesson from the history of science is that also such relatively robust theories are subject to radical change: consider the history of the theory of heredity (we do not use the term 'genetics' on purpose here!), or of the origin of species (we do not use the term 'evolution' on purpose here!), or of the very concept of life, or of the nature of the heart, or of the brain, and so on (2022, 10).

While it's perhaps true that all or most theories are subject to radical change, this does not imply that all or most theories are *equally likely* to undergo such a change. Since this construal of the dilemma does not hinge on a general and uniform skepticism, it must take into consideration the epistemic heterogeneity of scientific theories. For instance: quantum gravity seems more likely to undergo radical change than the physics of ordinary matter, or paleontology, or the sociology of religion. More generally, all things being equal, theories burdened with substantial conceptual opacity and foundational disagreements are much more likely to undergo radical change than those unencumbered by such issues. Much of current physics fall into the former category (as Erez Firt et al. themselves argue) while many other theories, including some branches of current physics, fall into the latter. As Larry Laudan puts it:

> … We have learned enough about what passes for science in our culture to be able to say quite confidently that it is not all cut from the same epistemic cloth. Some scientific theories are well tested; some are not. Some branches of science are presently showing high rates of growth; others are not. Some scientific theories have made a host of successful predictions of surprising phenomena; some have made few if any such predictions. Some scientific hypotheses are *ad hoc;* others are not. Some have achieved a 'consilience of inductions'; others have not (1983, 124).

Since not all theories are 'cut from the same epistemic cloth', not all theories possess their own 'first horn' (assuming the non-skeptical perspective adopted by the non-skeptical construal of dilemma). In other words, for some theories, radical change is unlikely (though never impossible). According to the non-general construal of the dilemma, current physics does not fall into this category. Consequently, the non-general construal of Hempel's dilemma turns out to be, unsurprisingly, non-generalizable. Its applicability must be determined on a case-by-case basis: it only applies to theories that, *due to their specific characteristics* rather than general skeptical reasons, are likely to undergo radical change. What about theories of the mental? Are their specific characteristics likely to render them prone to radical change? Folk psychology, for example, is exceptionally stable, having undergone minimal growth

and upheaval throughout the millennia it has existed[18]. If the ceteris paribus generalizations of folk psychology are roughly true and the mental properties these generalizations invoke are considered non-illusory (as most dualists tend to believe), then folk psychology provides us with a paradigmatic mind-body principle theory that is largely untouched by the non-skeptical construal of the dilemma: one that is highly unlikely to undergo radical change. The same reasoning can be applied to some of the more empirically oriented branches of psychology, such as social psychology, behavioral psychology, and clinical psychology, among others. While these disciplines are undoubtedly subject to change and growth, they do not exhibit the foundational volatility and opacity some branches of current physics do. Much of this stability can be attributed to the mundane and mostly observable nature of the phenomena these disciplines study, in contrast to the epistemically distant and theoretically intricate nature of fundamental physics. Regardless of the underlying cause of this distinction, empirically-oriented psychology offers further examples of theories that do not succumb to the non-skeptical construal of Hempel's dilemma. However, *even if* all mind-body theories are as prone to radical change as current physics, only the latter is harmed by the non-skeptical construal of the dilemma, since most other theories are unthreatened by its the second horn. Note that the second horn operates differently under both construals. Under the skeptical, pessimistic-induction motivated construal, physics will never achieve stability, and all future physical theories are destined to be falsified and replaced. It is this inevitable succession of radical change that makes future physics unfit for physicalist purposes. The quarks and spins of current physics will be the equivalents of Aristotelian entelechies for our descendants: the ancient remnants of discarded science. This perpetual cycle of falsification renders future physics wholly epistemically inaccessible and reduces physicalism to an empty thesis. This is not the case, however, under the non-skeptical construal: a resolution of the foundational puzzles currently perplexing physics will likely involve radical change. However, barring skeptical considerations, there is no reason to think that such change would render future physics entirely, or even mostly, unknowable. It is highly likely that the entities and processes postulated by this future, amended physics will largely coincide with those postulated by current physics. It may still include electrons, magnetic fields, familiar constants and a wave function, or at the very least, closely analogous replacements. This kind of physics provides us with a sufficiently definite concept of the physical, thereby enabling a non-vacuous formulation of physicalism. What, then, is so harmful about the second horn under the non-skeptical construal? As noted by Erez Firt et al. themselves, the real concern lies in the threat of trivialization, or what Poland (2003) - following Chomsky (1988) – refers to as the 'downward incorporation' of mental entities into physical theory. As Erez Firt et al. observe, this is more than a mere possibility: numerous well-considered downward incorporating physical theories are currently contending for approval among theoretical physicists, with more anticipated in the

[18] Some view this stability as a defect and a reason to reject folk psychology (Churchland, 1981), while others think it is a perfectly benign and unsurprising trait, given folk psychology's subject matter and explanatory objectives (Horgan & Wooward, 1985, Hannan, 1993).

future [19]. However, the threat of downward incorporation only applies to theses with exclusionary ambitions: those which aim to reduce or ground entities of one kind, upon entities that solely belong to a different kind. If these seemingly distinct kinds turn out to comprise a single kind, the exclusionary thesis is thwarted. In our context, if mental properties turn out to be among the fundamental physical properties, then physicalism is thwarted. Mind-body dualistic theories harbor no exclusionary ambitions: they systematically integrate both the mental and the physical and are therefore inherently non-exclusionary. Accordingly, these theories remain unaffected by the second horn of the non-skeptical construal of the dilemma. Deep-structure dualist theories also fare quite well with the second construal. While they are vulnerable to the first horn due to their reliance on speculative and potentially unstable scientific theorizing, they are immune to the second horn since they, like all other dualist theories, lack exclusionary ambitions. As previously mentioned, both the explanatory ambitions of the physicalist and those of the deep-structure dualist expose them to the first construal of the dilemma, as both positions pursue deep-structure explanations. However, the physicalist's explanatory ambitions surpass even those of their deep-structure dualist counterpart. Unlike the latter, the physicalist aims to achieve a metaphysical unification of apparently discrepant physical and mental phenomena, as reflected by physicalism's exclusionary ambitions. Thus, physicalism's susceptibility to the second horn of the second construal of Hempel's dilemma results from its far-reaching explanatory ambitions, a susceptibility which, in that sense, is not a pure detriment[20]. To sum up: the non-skeptical construal of Hempel's dilemma primarily affects physicalism, due to its unique vulnerabilities. Firstly, many theories, including various theories of the mental, are less prone to radical changes then current physics. As a result, these theories remain unaffected by first horn of the non-skeptical construal of the dilemma. Secondly, mind-body dualistic theories lack any exclusionary ambitions, rendering them immune to the second horn of the non-skeptical construal of the dilemma. Therefore, while these theories largely escape unscathed, physicalism emerges as distinctly susceptible to both horns of the non-skeptical construal of the dilemma.

5 Conclusion

In this paper I have argued that the reach of Hempel's dilemma is inseparable from its construal: While the general-skeptical construal applies to all changeable deep-structure theories, the non-skeptical construal predominantly targets those theories that are exceptionally volatile and harbor exclusionary ambitions. Consequently, Dualism emerges largely unscathed from both construals. This can be attributed to two key factors: Firstly, principle theories like folk-psychology and some branches of empirical psychology promise to provide us with a well articulated and stable concept of the mental. If the mental properties populating these theories are not mere

[19] Erez Firt et al. cite Von Neumann (1932) and Chalmers and McQueen (2023) as potentially downwardly incorporating interpretations of quantum measurement.

[20] I thank an anonymous reviewer of this journal for this comment.

theoretical constructs, then they remain beyond the reach of the pessimistic induction and deep-structure upheavals. Secondly, numerous theories of the mental are not prone to radical change and lack any exclusionary ambitions. As a result, these theories are inherently resistant to the challenges posed by the non-skeptical construal of the dilemma. Physicalism, on the other hand, presents a contrasting picture. It is uniquely susceptible to both construals of the dilemma for several reasons. Its steadfast commitment to deep-structure realism exposes it to the perils of the general-skeptical construal of the dilemma. Furthermore, the inherently exclusionary ambitions of physicalism, combined with the high volatility and propensity for radical change in certain branches of fundamental physics, makes it a prime candidate for the non-skeptical interpretation of the dilemma. Hempel's dilemma turns out not to be everyone's problem: It is particularly detrimental to physicalism and relatively congenial to dualism, as it is typically thought to be.

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