Explanation and the Explanatory Gap.

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Introduction

"The Explanatory Gap" is a label for the idea that we cannot explain consciousness in terms of brain activity. There are many different formulations of the explanatory gap, but all discussion about it assumes that there is only *one* gap, which consists of the absence of a *deductive* explanation.

This assumption is mistaken. In this paper I show that the position that deductive explanation is privileged in this case is unmotivated. I argue that whether or not there is an explanatory gap depends on the kind of explanation in question, so there is no single, unified explanatory gap but only the absence and (perhaps) presence of different sorts of explanation.

In Section 1 the explanatory gap is introduced. It is shown that the position that only a deductive explanation could close the explanatory gap is widely accepted, and three motivations for this position are identified: the view that all explanation is deductive, the view that all reductive explanation is deductive, and the view that deductive explanation is the most complete form of explanation. In Section 2 it is shown that not all explanation is deductive. In Section 3 it is shown that not all reductive explanation is deductive. In Section 4 it is shown that deductive explanation is not necessary for complete explanation. In Section 5, the implications of these conclusions for "the" explanatory gap are discussed. I argue that, by undermining motivation for the view that the explanatory gap could only be closed by deductive explanation, I have shown that considerations about deductive explanation fail to capture what is philosophically intriguing about consciousness. I

then explore the implications of this finding for the claim that the explanatory gap is a challenge to physicalism.

Section 1: The explanatory gap

The basic idea behind the explanatory gap is that conscious experience appears to be impossible to explain in terms of facts about the brain, physical facts or, indeed, facts about anything other than conscious experience itself. For example, in a canonical formulation of the explanatory gap Thomas Nagel argued that we will never have an explanation of consciousness, which is first-personal, in terms of physical facts, which are third-personal, simply because we cannot address the first-person in terms of the third.[1] Alternatively, Joseph Levine has argued that there is a gap of *intelligibility* between consciousness and physics, such that physics cannot make consciousness intelligible.[2] For some authors the explanatory gap is merely an epistemological feature, but others take the gap to be an epistemological feature with metaphysical consequences, and argue that our apparent inability to explain consciousness poses a challenge to physicalism.

In all of the literature on the explanatory gap, it is assumed that the missing explanation in question is *deductive*. An explanation is deductive when it is a necessary condition for the explanation that the explanandum is deduced from the explanans, and the explanation would fail without the deduction. For example, Hempel and Oppenheim's Deductive-Nomological model of scientific explanation is a model of deductive explanation, because it is a necessary condition for D-N explanation that the explanandum can be deduced from the explanans.[3] To illustrate the assumption that only a

[1] Nagel, T. (1974)
[2] Levine, J. (1983)
[3] Hempel, C. & Oppenheim, P. (1948)

deductive explanation could close the explanatory gap, consider Joseph Levine and David Chalmers' versions of the explanatory gap thesis. Levine argued that facts about consciousness are not intelligible in terms of physical facts, and so that we can never be sure whether psychophysical identities are contingent or necessary. Levine used the term "explanatory gap" for the thesis that there is such a gap in intelligibility.[4] In later writing Levine expanded on this position, and added the detail that the missing explanation in the case of the explanatory gap must be deductive. This commitment was motivated by the belief that all scientific explanation must involve deduction. As he put it, *'in a good scientific explanation, the explanans either entails the explanandum, or it entails a probability distribution over a range of alternatives, among which the explanandum resides. In other words, I take explanation to essentially involve deduction.*'[5] Chalmers acknowledged the possibility of a non-reductive explanation of consciousness[6] but held that the only kind of explanation that could close the explanatory gap is reductive explanation, which, he argued, necessarily involves logical supervenience.[7] According to Chalmers, any successful reductive explanation is one in which the explanans shows that the explanandum had to occur *of logical necessity*. He argued that logical supervenience is necessary for reductive explanation by arguing that without having established that higher-level explanandum phenomenon logically supervenes on some lower-level phenomenon, any attempt at explanation will always leave questions open about *why* the explanandum phenomenon occurred. This makes the attempt at explanation unsuccessful, and so a phenomenon that is not logically supervenient on the lower-level phenomenon that gives rise to it cannot be reductively explained.[8]

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[4] Levine, J. (1983)
[5] Levine, J. (2000) Pg 74.
[6] Chalmers, D. (1996) Pg 122.
[7] Chalmers , D.(1996) Pg 48. Chalmers argues that logical supervenience is not only necessary but also sufficient for reductive explanation, but for the purposes of this discussion I will focus simply on the necessity claim.
[8] Chalmers, D. (1996) Pg 48.

The explanatory gap has played a major role in contemporary philosophy of mind and responses to it have generated a substantial literature. For example, the *phenomenal concepts strategy* appeals to special features of the concepts involved in phenomenal experience to show that physicalism can be defended in the face of the explanatory gap.[9] A major debate has also taken place over whether a physicalist explanation of consciousness must involve a priori derivation.[10] Many have argued that the existence of an explanatory gap has no metaphysical implications, because the underivability of facts about consciousness does not indicate a metaphysical distinction between physical facts and facts about consciousness.[11] Along similar lines, some have argued that even if there is an explanatory gap, we have good abductive reasons for thinking that physicalism is true.[12] Throughout all of this discussion, however, the assumption that the missing explanation in the explanatory gap is deductive prevails, and can be found in the work of a number of different authors on this subject, including Balog, Kriegel, Nagel, Jackson and Tye.[13]

Why, then, is deductive explanation so important in this particular case? We have already seen some motivation for this in Levine and in Chalmers. One motivation is the view that all explanation, or at least all scientific explanation, is deductive, and this motivation is evident in Levine's formulation of the explanatory gap. A second motivation is that all reductive explanation must be deductive, and this is evident in Chalmers's formulation of the explanatory gap, and is partly based on connections between reduction and reductive explanation. A further motivation is the idea that deductive explanation is more complete than other forms of explanation. On this view, even if you accept that some explanations are not deductive, you might still think that deductive explanation is a privileged,

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[9] Balog, K. (2012); Stoljar, D. (2005)
[10] Block, N. & Stalnaker, R. (1999); Jackson, F. and Chalmers, D. (2001)
[11] Papineau, D. (1995)
[12] Biggs, S. (2011)
[13]Balog, K. (2012); Kriegel, U. (2011); Nagel, T. (1974); Jackson, F. and Chalmers, D. (2001); Tye, M. (1999)

special form of explanation in that it is the most complete. This is reflected in Chalmers' claim that reductive explanation must leave open no questions about *why* the explanandum phenomenon occurred, given the explanans.[14]

In what follows I will explore these three motivations: that all explanation is deductive, that all reductive explanation is deductive, and that deductive explanation is the most complete form of explanation. I will show that these motivations are misguided, and in doing so undermine the support for the position that only a deductive explanation could close the explanatory gap.

Section 2: Non-deductive explanation

In this section I argue that not all explanations are deductive by examining the cases of mechanistic and statistical explanations, and arguing that mechanistic and statistical explanations are not always deductive.

2.1 Mechanistic Explanations

Roughly speaking, a mechanistic explanation is an account of the parts and the relations between the parts of the mechanism that gives rise to the explanandum phenomenon. Exactly what a mechanism is and what is involved in giving an account of the parts and their relations are details that differ slightly across different accounts of mechanistic explanation.[15] For an example of a mechanistic explanation, Bechtel and Abrahamsen describe this explanation of carbohydrate metabolism:

[14] Chalmers, D. (1996) Pg 48
[15] See Craver, C. (2007); Machamer, P., Darden, L. & Craver, C. (2000)

> *This is explained by decomposing the responsible mechanism into various enzymes (parts) that catalyze intracellular biochemical reactions (operations) in molecular substrates (another kind of parts)… The complete set of reactions is known as the Krebs cycle…The account can be completed by describing the spatiotemporal orchestration of the organized components in real time, that is, their dynamics.* [16]

According to Bechtel and Abrahamsen the parts of the mechanism need not be restricted to object-like components, such as the parts of a watch, but can also include reactions or processes. For a simpler example, consider an explanation of the closing of the human jaw: we can give a simple mechanistic explanation of the closing of the jaw by describing the component bones and muscles, their organization and interactions.

Mechanistic models of explanation were developed in response to philosophical concerns about traditional accounts of explanation, and the apparent failure of those accounts to accurately capture the nature of explanation in certain branches of the special sciences, such as neuroscience or biology. One such problem was the fact that traditional models of explanation (such as Deductive-Nomological explanations) often portrayed explanation as necessarily involving laws. According to a traditionally popular conception of laws, laws are perfectly general, exceptionless and universal, and proponents of mechanistic explanation argued that this conception of laws excludes most laws of the special sciences and portrays most scientific generalizations as accidental.[17] Philosophers accordingly sought to develop models of scientific explanation that did not involve laws to permit explanations of phenomena in the special sciences, and more generally to vindicate the idea that regardless of whether or not there are laws of the special sciences, there are special science explanations.

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[16] Bechtel, B. & Abrahamsen, A. (2006) Pg 3.
[17] Goodman, N. (1984) pg 22-27 and pg 73-83; Hempel, C. (1965) pg 338-343; Nagel, E. (1961) pg 47-78; Mitchell, S. (1997); Machamer, P., Darden, L. & Craver, C. (2000)

Mechanistic explanation is generally not thought to be deductive. No accounts of mechanistic explanation make deduction a requirement, and mechanistic explanations are often presented as an alternative to deductive models of explanation. However, little attention has been devoted to the question of *why* this is so and in this section I will explain why it is the case that mechanistic explanations need not be deductive.

Mechanistic explanations do not take the form of arguments, and so one might think that they are not deductive simply for this reason. But, of course, this does not settle the question of whether or not mechanistic explanations are deductive, because rather than asking whether or not mechanistic explanations take the *form* of arguments, we should ask whether or not, in order to be successful, a mechanistic explanation must offer *resources* for formulating a deductive argument. Two ways in which a mechanistic explanation could offer resources for a deductive argument are 1) to offer an account of a law-like relation, which would provide resources for a deduction of the sort offered in a deductive-nomological explanation, or 2) to offer an account of a conceptual connection or identity that would provide resources for a deductive argument.

If a mechanistic explanation must offer an account of a law-like relation in order to be successful, then any attempt at mechanistic explanation that fails to do so would fail to explain. But the success of a mechanistic explanation does not depend on the modal status of the description of the interactions between the parts of the mechanism. The interaction between the parts of the mechanism does not have to be shown to be law-like by the explanation. Of course the interaction will be law-governed, in so far as all causal interactions are law-governed, but the mechanistic

explanation need not show that the relevant events obtain of natural necessity (or indeed of any order of necessity) in order to be successful.

Evidence for this can be found in the general form of mechanistic explanations. We can give a successful mechanistic explanation of an event which, given the facts about the mechanism underlying it, may be rare or even a one-off. For example, we may explain why a certain person had a heart attack at a particular time by describing a physical mechanism that in many cases does not lead to a heart attack. All that is required for the mechanistic explanation to be successful is to show how the explanandum event happened *in this case*. The explanation need not rule out the possibility that the explanandum event might not have happened in another case given a similar mechanism. Some such cases may be explanations of events that are genuinely chancy – so, given the explanans, the explanandum was not determined. Alternatively, other such explanations may be of non-chancy events, but cite only contingent causal facts, with no reference to the laws that govern them. In either case, the mechanistic explanation may succeed without showing that the explanandum phenomenon *had* to happen.

This feature of mechanistic explanation is also borne out by the literature. For example, accounts of mechanistic explanation do not impose any requirements on the modal status of the interactions between the parts of the mechanism described in the explanation.[18] Furthermore, the mechanistic explanation may still be successful while generalizations about those interactions may be ceteris paribus generalizations, and it is an open, controversial question whether or not ceteris paribus generalizations can also be laws.[19] Finally, if mechanistic explanations work as explanations, they do so independently of what may turn out to be true about laws of nature. There may be ceteris paribus

[18] Craver, C. (2007); Bickle, J. (2003); Bechtel, B. and Abrahamsen, A. (2006)
[19] Cartwright, N. (1980); Earman, J., Glymour, C., and Mitchell, S., (eds.) (2003); Lange, M. (2002)

laws and there may be laws of the special sciences, but the legitimacy or otherwise of mechanistic explanations is not determined by these results about laws.

A second way in which mechanistic explanation could be necessarily deductive is if it were a requirement that successful mechanistic explanation must identify logical or mathematical connections between the parts of the mechanism and their activities, rather than nomic connections. For a very simple example, consider a situation in which I run eight miles and then swim two miles. If I want to then explain the fact that I travelled ten miles, I could cite the facts that I ran eight miles and swam two miles, and that these facts entail that I travelled ten miles.[20] The current proposition is that every mechanistic explanation must identify such logical or mathematical connections between its elements. However, this is simply too stringent a requirement on mechanistic explanation, and including it would undermine one major motivation for the development of the mechanistic model of explanation. A significant motivation for proponents of mechanistic explanation was to move closer to actual scientific explanatory practices, particularly in the special sciences, and to move away from an idealized abstraction of those explanatory practices. Including the requirement that mechanistic explanations must describe *logical* connections between components of a mechanism would undermine that motivation.

It is commonly accepted that mechanistic explanation is not necessarily deductive and in this section we have discovered why this is the case: mechanistic explanations need include neither descriptions of laws nor descriptions of logical or conceptual connections between the elements of the mechanism.

[20] Thanks to <removed for blind review> for pressing this point.

2.2 Statistical Explanation

There are a number of different accounts of statistical explanation such as, for example, Hempel and Oppenheim's Inductive-Statistical model and Salmon's Statistical-Relevance model.[21] In many models of statistical explanation the explanans shows that the explanandum is *likely*.[22] In some cases, such as the Inductive-Statistical model, this means that the explanans forms a strong inductive argument for the explanandum. In Salmon's Statistical-Relevance model, the explanans identifies factors that are statistically relevant to the explanandum. We do not need to examine these models in detail to see that in a statistical explanation the explanans does not entail the explanandum. In the case of the Inductive-Statistical model this is made explicit in the definition; the explanans constitutes a strong inductive argument for the explanandum. Accordingly statistical explanation is a form of explanation that does not necessarily involve deduction.[23]

These case studies of mechanistic and statistical explanation show that the position that all explanation must be deductive is implausible, and hence undermines this motivation for believing that only a deductive explanation could close the explanatory gap.

Section 3: Non-deductive reductive explanations

Reductive explanation is not reduction, but is closely related to reduction. In reductively explaining a phenomenon, we explain it in terms of some lower-level phenomenon. Another way to put this is that reductive explanation is explanation in which the explanandum is explained in terms of

[21] See Salmon, W. (1989); Hempel, C. & Oppenheim, P. (1948)
[22] Though this is not always the case. See e.g. Railton, P. (1978) on the explanation of low probability events.
[23] Note that this claim does not rest on the belief that one cannot deduce statistical claims, which is clearly false, but on the claim that statistical explanations do not necessarily involve the deduction of statistical claims.

something more fundamental.[24] This presupposes a well-understood notion of 'levels', which is controversial, but I will assume that canonical examples such as distinctions between special sciences and more fundamental sciences, or between facts about consciousness and physical facts, are distinctions between levels.

It is important to note at this stage that a lot is packed into the idea that reductive explanation *is explanation*, and that simply mentioning something more fundamental than the explanandum phenomenon is not, of course, sufficient to explain it. I will not attempt to settle the question of what explanation is here, but suffice to say, whatever it is that explanation achieves, reductive explanation achieves that by spanning descriptions of different levels. For example, regardless of what explanation is in general, neuroscientific explanations of psychological phenomena can be reductive, physical explanations of chemical phenomena can be reductive, and a physical explanation of consciousness, were one available, could be reductive.

One common motivation for the view that reductive explanation must be deductive is that reduction is commonly thought to be deductive. The position that reduction is deductive has historical precedent in Ernest Nagel's influential account of reduction as a logical derivation of the reduced phenomenon from its reduction base plus connecting bridge laws.[25] However, that model of reduction has been shown to be problematic for a number of reasons, including the lack of successful Nagel-style reductions and the restriction of reduction to theories, rather than a view that could also encompass models. Alternative models of reduction were proposed in place of Nagelian

[24] Some would reject the identification of levels with a distinction in fundamentality. I use this locution merely for illustrative purposes.
[25] Nagel, E. (1961)

models in response to just such problems.[26] Accordingly, this view of reduction does not in itself provide sufficient support for the position that reductive explanation must be deductive.

Another motivation comes from the idea that deductive explanation is metaphysically privileged, and is the only form of explanation that can capture particular metaphysical connections. For example, one might think that only deductive explanation could capture a 'nothing over and above' relation simply because if one thing is identical to another than this provides resources for a deduction. But the view that deductive explanation is a good guide to such metaphysical connections is problematic, as a deductive argument can be easily gerrymandered depending on what is included in the premises. For example, consider a case in which I am attempting to explain fact about conscious experience P in terms of physical brain configuration B. With only B in my explanans, I cannot deduce P. If I simply include the premise "If B obtains then P obtains" in my explanans, then I have deduced P. My deductively explaining P in terms of P is supposed to indicate a "nothing over and above" relation, and yet clearly the addition of this premise was an arbitrary matter, and hence not a good guide to whether or not P really is metaphysically over and above B.

Another motivation for the position that reductive explanation must be deductive is the idea that deductive explanation is the most complete form of explanation. However, in Section 4 I will argue that this belief is mistaken.

One might wonder what a non-deductive reductive explanation would look like, and there are plenty of illustrative examples. For instance, the serotonin theory of depression offers a mechanistic explanation in which a psychological phenomenon, depression, is explained in terms of a

[26] See e.g. Churchland, P. (1985) and Bickle, J. (1998)

neuroscientific mechanism. This is a case in which a higher-level phenomenon is explained in lower-level terms. Alternatively, a statistical explanation of a population-level phenomenon in terms of the behavior of its individual members is a reductive statistical explanation, in so far as it gives an account of the higher-level phenomenon in lower-level terms. An example of reductive mechanistic explanation can be found in John Bickle's study of memory consolidation in mammals. Bickle argues that he has explained memory consolidation in terms of activity in a particular molecular pathway, and in doing so has explained a psychological phenomenon, memory consolidation, by giving an account of a genetic mechanism.[27] Alternatively, for a reductive statistical explanation consider an idealized version of a case discussed by Salmon in which 25% of a population of humans develops the medical condition paresis. Say for the sake of argument that every member of this population has untreated syphilis, and that people with untreated syphilis have a 25% likelihood of developing paresis. An explanation for the fact that 25% of the population develops paresis (a fact about the population and hence a higher-level feature) is that every member of the group has untreated syphilis (a fact about the individuals composing the group and hence a lower-level feature), and so each member of the population has a 25% likelihood of developing paresis.[28]

In each of these cases we do not need to accept the particular explanation as legitimate in order to endorse the general claim. We may not think that Bickle has successfully explained memory consolidation, or that the facts about the individual explain the facts about the population, and yet still accept that mechanistic and statistical explanations can in some cases span different levels. As we have seen, there is little motivation for the position that reductive explanations must be deductive.

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[27] Bickle, J. (2003), Chapter 2.
[28] For a different presentation of this syphilis-paresis case, see Salmon, W. (1971) Pg 57.

Section 4: Deductive explanation and completeness

A final motivation for the position that only deductive explanation could close the explanatory gap is the belief that deductive explanation is the only form of explanation that is complete. On such a view even though there may be non-deductive explanations, they are not full or complete explanations. In this section I will explore some motivations for this position, and argue that it is unfounded.

One motivation for the position that deductive explanation is more complete than any other form is simply the position that all explanation is deductive. But we have already seen that there is good reason to reject the view that all explanation is deductive, and so we need not spend further time on this position. A more viable motivation for the view that deductive explanation is the most complete form of explanation is the position that deductive explanation leaves open no further questions about why, given the explanans, the explanandum phenomenon occurred. Because, of course, if the explanans deductively entail the explanandum, there is nothing more to be said about why, given the explanans, the explanandum occurred.

However there are deep problems with the view that deductive explanation is the most complete, regardless of how it is motivated. If this principle, that deductive explanation is the most complete form of explanation, is true, then making a non-deductive explanation into a deductive explanation should make it more complete. But it is not the case that making a non-deductive explanation into a deductive explanation makes it more complete. Consider, for example, the case of a mechanistic explanation, such as the explanation of the Krebs cycle described in Section 2. It is implausible that for every non-deductive mechanistic explanation, the addition of an arbitrary conditional that makes

the explanation deductive will make the explanation more complete than the original mechanistic explanation. And yet this is a principle that we must accept if we are to accept that deductive explanation is the most complete form of explanation.

The idea that deduction is not what makes an explanation complete is reflected in the nature of some classic counterexamples to Hempel & Oppenheim's Deductive-Nomological model of scientific explanation. According to Hempel and Oppenheim, for some explanans to offer a D-N explanation of an explanandum, the following must be true:

i) The explanans must constitute a valid deductive argument for the explanandum.
ii) The explanans must include a law of nature as an essential premise of the deductive argument, such that if the premise were excluded, the deduction would not go through.
iii) The explanans must include empirical content.
iv) The premises in the explanans must be true. [29]

There are a number of famous counterexamples to this model, including the case of the flagpole's shadow and the case of the barometer and the storm.[30] We can construct an attempt at explanation that meets conditions of the D-N model but is intuitively not an explanation in which the length of a shadow, combined with the location of the sun and the laws of geometry, explains the length of the flagpole that casts the shadow. This is a famous counterexample to the D-N model because the length of the shadow intuitively does not explain the height of the flagpole. Similarly, in another counterexample we can construct a D-N explanation of a storm coming in terms of the barometer falling, which is also intuitively not explanatory. These problem cases showed that the D-N explanation did not include sufficient information about, for instance, which causes are responsible for the explanandum. These cases indicate that even though these are examples of deductive

[29]Hempel, C. & Oppenheim, P. (1948). The original version of the D-N model is far more precise and what I have offered here is more like a characterization of the explicandum that the D-N model aims at, rather than the model itself. There are also a number of qualifications to note for even this rough characterization, including restrictions on what counts as a law of nature and that the explanandum cannot itself be a general or lawlike statement.
[30] Originally formulated by Bromberger although the specific flagpole case never appeared in his publications. Cases of a similar sort appear in Bromberger, S. (1966)

explanation, they miss out on some key detail without which the explanation is not fully complete. In acknowledging these cases we acknowledge that deduction is not a *guide* to the completeness of an explanation.

These considerations show that deductive explanation is not necessarily the most complete form of explanation. And so this motivation for thinking that the explanatory gap can be closed only by deductive explanation is undermined.

Section 5: Implications

The primary motivations for the position that only a deductive explanation could close the explanatory gap have been undermined. Explanation in general need not be deductive, reductive explanation need not be deductive, and deductive explanation is not the most complete form of explanation. We can now consider the implications of these results for debates about the explanatory gap.

What seemed so intriguing about the explanatory gap is that it is apparently impossible to understand consciousness in terms of anything else, and a failure of explanation appeared to be at the heart of this problem. Most of those writing on this topic assumed that the explanatory gap could be closed only by a deductive explanation. But as we have discovered, there is no justification for the privileged position that deductive explanation has played in this debate, and so there is no good reason to think that only a deductive explanation could close the explanatory gap. A significant implication of this finding for debates about the explanatory gap is that, if deductive explanation is not privileged in this case, then there is no single, unified explanatory gap. Instead, claims about the

explanatory gap are relative to a particular form of explanation. If there is a mechanistic explanation of consciousness but no explanation of consciousness that involves a priori analysis, then we face a situation in which there is no explanatory gap relative to mechanistic explanation and there is an explanatory gap relative to explanation involving a priori analysis. There is no single explanatory gap, but instead only unavailable or (perhaps) available explanations of different sorts.

This does not settle debates about about whether or not the explanatory gap is a challenge to physicalism, but it changes and reframes those debates, particularly insofar as it makes the task of showing that there is a metaphysically significant explanatory gap more complicated. The proponent of the explanatory gap must either show that one form of absent explanation is privileged with respect to this case, or else show that no form of explanation is available in this case. The original proponents of the explanatory gap would perhaps argue that they *have* shown that no explanation is available in this case, but this claim was based on the idea that certain explanatory attempts failed because they were not deductive.[31] Given that this standard is not appropriate, a different strategy is now required to show that no explanation is available that could close the explanatory gap. It may well still turn out that there is no explanation available in this case, but showing that this is so will take a thorough exploration of different forms of explanation and their availability in this instance. The outcome does not simply follow from the assumption that the explanation in this case must be deductive. Overall, then, this discussion reframes the debate about the explanatory gap in a way that makes it more complicated, but not impossible, to argue for a metaphysically significant explanatory gap.

[31] See for instance Chalmers' discussion of research into the neural correlates on consciousness in Chalmers, D. (1996) pg 115-118

The abandonment of the assumption that only a deductive explanation could close the explanatory gap is also relevant to claims about the contingency or otherwise of the explanatory gap. Some have argued that the gap will *never* be closed, because there are no lawlike or conceptual connections between facts about consciousness and physical facts about the brain that would permit a deductive explanation of the former in terms of the latter.[32] But given that now the deductive standard is no longer in play, it will take more to justify the claim that a satisfactory explanation *could* never be developed in this case.

These discussion is relevant to the phenomenal concepts strategy, in which philosophers have argued that the explanatory gap does not pose a challenge to physicalism because consciousness involves special, "phenomenal" concepts that explain the explanatory gap, in so far as the give an account of why such a gap obtains.[33] The idea that deductive explanation is not privileged in this case lends some extra plausibility to the phenomenal concepts strategy. It may be that a certain kind of conceptual connection that would permit deductive explanation is impossible in this case, if the proponents of phenomenal concepts are correct. If that were the case then it would be unsurprising that no deductive explanation is available, but alternative forms of explanation may still be available, either now or pending certain future scientific developments. There is also a more general moral to be drawn from the case of the explanatory gap, which is that *any* move from the absence of a particular form of explanation to a metaphysical claim should be made with care, and requires a careful study of the many different forms of explanation and their potential metaphysical significance.[34]

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[32] e.g. Nagel, T. (1974)

[33] See Balog, K. (2012); Stoljar, D. (2005)

[34] Such as the case of emergence, discussed in Taylor, E. (2015)

Conclusion

The position that there is an explanatory gap has played a major role in contemporary philosophy of mind, and in most literature on the topic it is assumed that the explanatory gap consists of the absence of a deductive explanation. In this paper it was shown that this position is unmotivated, and that there is no justification for the position that the explanatory gap could only be closed by a deductive explanation. Accordingly, the absence of a deductive explanation does not capture what is philosophically intriguing or interesting about consciousness, and there is no single explanatory gap, only the absence and (perhaps) presence of different sorts of explanation. This does not settle the debate between those who see the explanatory gap as a challenge to physicalism and those who do not, but it does show that any attempt to use the explanatory gap as a challenge for physicalism cannot be based on the assumption that only a deductive explanation could close the explanatory gap. Any attempt to move from the absence of an explanation in this case to a denial of physicalism must go through a careful study of the different forms of explanation, their availability in this case and their metaphysical significance.[35]

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[35] Thanks to Stephen Biggs, Elizabeth Miller, Karen Neander, the audience at the Mountain Plains Philosophy Conference, and an anonymous referee for helpful discussion. Work on this paper was supported by the National Endowment for the Humanities, although views expressed here do not necessarily represent those of the Endowment.

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