The Type-Token Distinction and the Mind and Brain Sciences

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Abstract

This paper is an analysis of scientific types – the categories of a scientific taxonomy. I argue that the philosophical view about mental types stands in contrast to the real nature of scientific types, which is in turn responsible for the mind-body problem. Since the view on the relation between psychology and neurology was broadened to the status about special sciences in general, my argument can also be applied to the general special science discussion. My picture of types being the result of categorizing tokens with respect to their micro structure is used to show how scientific practice makes multiple realizability implausible.

Introduction: The Nature of Scientific Types and the Mind-Body Problem

The mind-body problem arises due to not knowing how terms denoting mental phenomena and terms denoting physical phenomena relate to each other. Many would perceive a detailed specification of how these terms relate to each other as an explanation of the mind and thus, several suggestions about the nature of this relation have been brought forward, including substance dualism (e.g. Popper and Eccles 1977), the identity theory (Feigl 1967; Place 1956; Smart 1959), the supervenience (Kim 1989, 1994) and the emergence thesis (Broad 1925) as well as the thesis of eliminative materialism (Churchland 1981).

The argument of "multiple realizability" which was particularly put forward Jerry Fodor (1987) and Hillary Putnam (1960; 1967a; 1967b; 1967c) had a significant impact on shaping the understanding of the relation between mental terms and neurological terms. This argument did not only have an influence on the mind-body debate but on the attitude towards special sciences like psychology, sociology, etc. in general (Fodor 1974, 1991). The point that Fodor articulates in order to generalise this argument is that the special sciences use terms that can be regarded as "natural kinds" of the special sciences i.e. that they are generalised theoretical entities which do have their own theoretical value in the theories of these special sciences. Special sciences, Fodor claims, primarily intend to find such generalisations and these terms generalise over physical instantiations that do not necessarily have something in common and would thus not form a physical natural kind.

The terms of interest for specifying the relation between the mind and the body are *type* terms. This is the case because type terms are supposed to denote *natural kinds* which reflect ontological facts. Furthermore, the generation of a type is exactly the generalisation at which theories aim. The interesting question is not only which kinds do exist but also what makes a token an instance of a certain type. It is exactly this last question on which I will try to shed some light on the next pages. To answer the question is thus to specify the relation between types and tokens in the context of the mind-body problem.

Although the question does not seem to be discussed very often, it is an absolutely nontrivial question what a mental type is. Unfortunately, intuitions seem to suggest a misleading picture. The often held hypothesis of the privileged (or non observational) access to one's own mental states is often taken to imply that one cannot be wrong about the types of mental state one experiences (Smart 1959, p. 152). It is my intention to show that the still

predominant picture of definite, sacrosanct (mental) types should be abandoned. It is clear that types based on the supposedly privileged introspection can only be types of a folk understanding of psychology and that is why I want to argue for the possibility that these can be changed by a deeper analysis.[1]

With regard to the physical side of the mind-body problem, it seems almost too obvious to declare that brain states – as philosophers perceive them – should be regarded as *neurological tokens*. But this view has not been very popular either. The motivation for declaring brain states not as neurological tokens but as neurological *types* was grounded in the curiosity to learn something about mental phenomena like pain in *general*. Mental types were of interest and not something about a certain mental state, event or property. So theorists just *needed* a neurological type that could be connected with a mental type.

By discussing the relation between tokens and types, the final aim is to contribute to the discussion about the relation between types of different disciplines. Thereby, my view about psychological type-terms and their origin as well as my view about neurological types stands in some disagreement with the classical philosophical picture

The relation between Types and Tokens

Because there seem to be definite convictions about how the mental types, which have to be reductively explained, really look like, the favoured procedure seems to be to keep the extension of the type fixed while investigating the reduction base. This is probably due to the direct "givenness" of phenomena like pain. Though I do not want to deny that people are experiencing types of pain, the pain-*type* is certainly *not* directly given, meaning that there is no *a priori* understanding of type terms like pain. Special sciences like psychology deal with macroscopic descriptions and consequently we should not expect the types of psychology to be indefeasible "brute facts" – i.e. that these types just exist "out there", independently from any instantiations or definitions.

Instead, types are classifications of the tokens which at the same time *should* reflect natural kinds in that there exist differences between the tokens that make the classification of the tokens reflect a fact. And if e.g. pain is a natural kind of psychology, then this type term of mental phenomenon is already a generalisation – a subsumption of what is essential for a token to be of this type. There is a very important point behind this insight, which is

[1] A very similar point, with which I am very sympathetic too, is brought forward by Bechtel and McCauley (1999).

demonstrated by Michael Pauen (2000, p. 399) who refers to Robert W. Batterman (2000): "…not all causal properties which can be observed on the microphysical level are relevant for type generation on higher levels."[2] Consequently, the type term's extension depends on the level of abstraction from the micro level properties of the tokens and the abstraction level determines how coarsely or finely grained the type will classify the tokens. Thereby the properties of a set of tokens to make up a type do not only rely on superficial properties of the tokens but also on their micro level structure. As a consequence of all this, the intuition of having a clearly defined picture about the types under investigation for which one simply has to decide if a certain token is an instance of that type seems to be more and more implausible. Eventually, the type under investigation might change due to new insights about the reduction base.[3]

When I said that phenomena like pain are thought to be directly given – whatever this means – it is clear that what is directly given can only be an instance of e.g. a pain experience and not a type of pain. Why then does it seem likely that even somebody who experiences a mental state or event for the first time will readily engage in type-talk about what he has experienced? It is because an abstraction or concept of a certain mental state or event can already be generated from only one instance which names the reason why obviously everybody believes to know what the types of mental phenomena are. This is the same with mental types as with all other types. To emphasise the picture of types being post hoc entities, generated from a collection of tokens, let me review the prime example of taxonomy: The taxonomy of species.

Type Generation Exemplarily Demonstrated in Biology

Types are the result of taxonomy generation. It is most basic to all sciences to bring the objects of investigation of the respective science in some order (Fodor 1974, p. 101). The claim that physical realisations might not need to have interesting commonalities to make up a special science type implies that the ascertainment of such unfamiliarity of the microstructure entities would not influence the type under investigation. The claim of *interesting* cases of multiple realizability is thus that types are resistant to the insight that there is no underlying "natural kind" on the microlevel. This claim seems to be especially

[2] Translated from German by myself.

[3] Actually, this process can also be regarded as a "moderate elimination" which might not be too far away from recent accounts of Patricia Smith Churchland (2002).

prominent when investigating psychological types. As “interesting cases”, I regard cases where the realisations do not have something essential in common. Surely, every object is multiple realizable in that the exact atomic structure will not be exactly the same. This though, is neither the case the multiple realizability argument wants to attack nor is it something anybody would wonder about (Pauen 2000).

Naturally, the most obvious properties are consulted when starting to generate a taxonomy of life-forms. Such properties might be “has legs”, “swims under water”, “flies”, “eats plants” and so on. The properties chosen to distinguish individuals will certainly depend on the life-form tokens one has encountered so far. As a consequence of such obvious discrimination criteria, it is not surprising that whales and dolphins were indeed part of the proto-taxon “fish”, while penguins were not part of the proto-taxon “bird”. Of course this does not mean that these categories were scientifically useless, since they were necessary starting points of the investigation. However, it does not mean that the proto-taxa are in any way sacrosanct either. What has happened when one of our ancestors who used the proto-taxon of “fish” realized that some of these “fish” have characteristics that are more similar to animals that he had classified as non-“fish” while all other “fish” share another common characteristic that the strange “fish” do not? He will certainly not have thought: “Oh, there are no fish.” Instead, he could have adopted a stance popular with some of today’s philosophers: While adhering to the original “fish” type, one acknowledges that all animals swimming under water do not share a common essential characteristic *except* from swimming under water. Hence our ancestor might have claimed that membership to the “fish” type is irreducible. After all, the essential property of swimming under water is multiple realizable.

Another possibility would be to invent new sub categories of “fish”. This looks like a good approach when one still thinks that swimming under water is the only (or most) essential criterion for being a fish. The trouble is that the strange “fish” have characteristics that seem to be essential for other animals, while no other animals have the characteristics of the normal “fish”. This favours the strange “fish” to be excluded from the “fish” category which becomes afterwards more a *fish* category and thus changes in its extension. The type “fish” has thus changed over time. This is based on the fact that people have changed their opinion on what is essential for being fish on the basis of characteristics on a lower, finer detailed description level.

The same process can repeat itself when one investigates the microstructure even further and analyses e.g. the DNA. In biology, as in the other sciences, the possibilities to

investigate even deeper microstructure organisations are most often paired with a controversy. The controversy is then about whether one should continue to categorise on higher level characteristics or should use the categories of an underlying description level. This happens when the deeper analysis reveals that actually two or more quite differently organised types have been grouped in one.

This enables us to reply to Fodor's claim that special science types bundle instantiations that do not have interesting commonalities on the lower level description (Fodor 1974). If this were true, it only shows a special science type is not a natural kind either and thus the discrepancy in micro level properties will also show a discrepancy in macro level properties. In other words: If there is no underlying natural kind for a special science type, meaning that this type is a disjunction of natural kinds, the macro level type will also be a disjunction of macro level natural kinds.

From this we learn that it can frequently change over time whether a certain token is part of a certain type. One might object that the original folk taxonomies have not changed but simply do coexist with the different scientific taxonomies. This is the reason why I chose the obvious example of fish, in which the folk understanding of what it means to be fish changed due to scientific progress as well. Though there seems to be a huge time lag between changes in folk and scientific taxonomy, folk taxonomy is not definite either. The same holds for folk *psychology*.

Natural Kinds of Psychology and Neurology

My main point in the last section was that we should not expect to have a clearly defined, incontrovertible type at hand when we use terms such as pain. This was because the extension of terms like pain depends on what we think is essential for a mental phenomenon while exactly the microstructure's revelation of a bundle of tokens that are supposed to be subsumed by that type is likely to change the notion about what is essential. Our first problem in the quest for psychophysical identities is thus the "slipperiness" of mental vocabulary. The second problem – whose solution would have repercussions for the first problem – is the misleading impression that philosophers have a *neurological* type (or at least an idea of one) available that could be used on the physical side with which to identify mental terms. In today's discussion "C-Fibre activation" is – though most often used – merely a placeholder for whatever neurological type there might be. I see a problem in using this placeholder since it seems to somehow shape philosophers imagination about how a neurological type could look like. What is right about the C-Fibre example is that this type

would at least be a type defined by neurological criteria, namely localisation and more important, histology – C-Fibres are supposed to be neurons that have their function because of the properties they have. Though localisation and histology are important differentiation criteria when "decomposing" the brain, these criteria are not very suitable candidates for constituting the kinds of types we are looking for since it is extremely unlikely that the information processed in the brain is coded (solely) by localisation and cell architecture.

So what is it that has to be done to solve the mind-body problem? Besides of the readiness to revise psychological types, a suitable neurological kind with the correct degree of granularity is needed. Neuroscientists become more and more aware of what are the crucial properties of neural activity and from what properties it has to be abstracted (e.g. Elger et al. 2004). Finally a granularity has to be reached, which allows answering the question for what makes a neurological token a token with a certain content.

Could Fodor under these circumstances, as he is doing it in the original Special Science article (Fodor 1974) really deny that neuroscience criteria could be found which naturally group the tokens in the way that they resemble the grouping of the mental tokens?. If one grants, as Fodor and most other do, a token identity, than scientific practise secures that mental tokens are classified by type terms in the same way as neurological types classify neurological tokens. If we could record brain states with the appropriate granularity, only a dualistic position would allow for the claim that the neurological tokens present when one is in pain do not have something in common. What we need is a measure of similarity to compare and classify neural activity with the suitable granularity. Then it will definitely show that the type terms of the more basic science allow for same degree of between token differences as the types of a more general discipline (also see Bechtel and Mundale 1999). If there is still a mismatch, we should not be too surprised. Eventually, our intuitive taxonomy of mental types might turn out to be inaccurate.

Conclusion: Hope for a Reductive Explanation of Special Science Types

The aim of this paper was to demonstrate that it might be a misconception of what types are and how types come about, that might be responsible for part of the mind-body problem. I tried to argue that types understood as post hoc structures over bundles of tokens would overcome this problem.

The multiple realizability argument builds upon a mismatch of the level of abstraction from unimportant properties in psychology and neurology. The same argument can be made about the status of special sciences in general: I argue that there is no reason why no criteria should be found that result in a one to one mapping of types when an identity of tokens of two disciplines is granted. But maybe even more important is what would happen if there are still mismatches in the way that the tokens on the neural level make it possible to differentiate between types that on the mental level are all classified as one type: then we would have good reason to differentiate between the mental tokens that project to different subtypes on the neural level too. In other words, if there is reason to believe that on one level the natural kinds are finer grained, then there will be a way of discovering slight differences of subtypes on the other level as well.

Finally, the practise of scientific taxonomy secures that types for which no accordant lower level natural kind can be found (e.g. by trying out different degrees of abstraction), will finally be changed themselves.

References

Batterman, R. W. 2000. Multiple realizability and universality. *British Journal of Philosophy of Science* 51 (1):115-145.

Bechtel, William, and Robert N. McCauley. 1999. Heuristic Identity Theory (or Back to the Future): The Mind-Body Problem Against the Background of Research Strategies in Cognitive Neuroscience. In *Proceedings of the 21st Annual Meeting of the Cognitive Science Society* Mahwah, NJ: Lawrence Erlbaum Associates.

Bechtel, William, and Jennifer Mundale. 1999. Multiple Realizability Revisited: Linking Cognitive and Neural States. *Philosophy of Science* 66 (2):175.

Broad, C. D. 1925. *The mind and its place in nature*. New York,: Harcourt, Brace & company, inc.

Churchland, Patricia Smith. 2002. *Brain-wise : studies in neurophilosophy*. Cambridge, Mass.: MIT Press.

Churchland, Paul M. 1981. Eliminative Materialism and the Propositional Attitudes. *The Journal of Philosophy* 78 (2):67-90.

Elger, Christian E., Angela D. Friederici, Christof Koch, Heiko Luhmann, Christoph von der Malsburg, Randolf Menzel, Hannah Monyer, Frank Rösler, Gerhard Roth, Henning Scheich, and Wolf Singer. 2004. Das Manifest; Elf führende Neurowissenschaftler über Gegenwart und Zukunft der Hirnforschung. *Gehirn & Geist* 6.

Feigl, Herbert. 1967. *The "mental" and the "physical"; the essay and a postscript*. Minneapolis,: University of Minnesota Press.

Fodor, Jerry A. 1974. Special Sciences, or the Disunity of Sciences as a Working Hypothesis. *Synthese* 28:97-115.

———. 1987. *Psychosemantics : the problem of meaning in the philosophy of mind*, *Explorations in cognitive science*. Cambridge, Mass.: MIT Press.

———. 1991. You can Fool Some of The People All of The Time, Everything Else Being Equal; Hedged Laws and Psychological Explanations. *Mind* 100 (397):19-33.

Kim, Jaegwon. 1989. The Myth of Nonreductive Materialism. *Proceedings and Addresses of the American Philosophical Association* 63 (3):31-47.

———. 1994. Supervenience. In *A Companion to the Philosophy of Mind*, edited by S. Guttenplan. Oxford: Blackwell.

Pauen, Michael. 2000. Identität und multiple Realisierung: ein prinzipieller Gegensatz? Paper read at GAP.4 Argument und Analyse, at Bielefeld.

Place, U.T. 1956. Is consciousness a brain process? *British Journal of Psychology* 47:44-50.

Popper, Karl Raimund, and John C. Eccles. 1977. *The self and its brain*. New York: Springer International.

Putnam, Hilary. 1960. Minds and Machines. In *Dimensions of mind; a symposium*, edited by S. Hook. New York: New York University Press.

———. 1967a. The Mental Life of Some Machines. In *Intentionality, minds, and perception; discussions on contemporary philosophy, a symposium*, edited by H.-N. Castañeda. Detroit,: Wayne State University Press.

———. 1967b. The Nature of Mental States. In *Mind, language, and reality*. Cambridge Eng. ; New York: Cambridge University Press.

———. 1967c. Psychological Predicates. In *Art, Mind and Religion*, edited by H. W. Capitan and D. D. Merrill. Pittsburgh: Pittsburgh University Press.

Smart, J. J. C. 1959. Sensations and Brain Processes. *The Philosophical Review* 68 (2):141.