Holism, Concept Individuation, and Conceptual Change

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Abstract

The paper discusses concept individuation in the context of scientific concepts and conceptual change in science. It is argued that some concepts can be individuated in different ways. A particular term may be viewed as corresponding to a single concept (which is ascribed to every person from a whole scientific field). But at the same time, we can legitimately individuate in a more fine grained manner, i.e., this term can also be considered as corresponding to two or several concepts (so that each of these concepts is attributed to a smaller group of persons only). The reason is that there are different philosophical and explanatory interests that underlie a particular study of the change of a scientific term. These interests determine how a concept is to be individuated; and as the same term can be subject to different philosophical studies and interests, its content can be individuated in different ways.

The topic of the present discussion is the individuation of concepts. I am primarily interested in scientific concepts and the phenomenon of conceptual change. My account will be based on a moderate holism about concept, using a conceptual role semantics—an approach that I view as fruitful for studying and explaining conceptual change in science, at least in biology.[1] In order to motivate my position, I will briefly look at some recent debates about conceptual role semantics. Jerry Fodor's and Ernest Lepore's (1992) critique of conceptual role semantics uses the following basic argument. Given that one rejects conceptual atomism and instead assumes that *some* inferential relations between expressions are meaning-constitutive, then the following dilemma arises. On the one hand, one could endorse a *radical holism*, according to which *all* inferential connections are meaning-constitutive. But Fodor and Lepore offer several arguments against the viability of this option. On the other hand, one could endorse a *localism*, according to which some, but not all inferences are meaning-constitutive. However, then we need a principled distinction between the meaning-constitutive and non-constitutive inferences, for example, a distinction between analytic and synthetic inferences. Given Quine's arguments against analyticity and synonymy, Fodor and Lepore assume that it is unlikely that there is any such distinction. Paul Boghossian (1996) replies by arguing that there is a distinction between meaning-constitutive and non-constitutive inferences. For unlike Quine, nowadays virtually everyone is a meaning realist—including Fodor and Lepore. It is usually assumed that there are determinate facts about what expression means what, and thus it is determinate whether two expressions are synonymous or not. This is Boghossian's reason for claiming that most participants in the debate about content are in fact committed to a distinction between meaning-

[1] I cannot defend this assumption here; but have done so elsewhere. See Brigandt (in prep.a) and (in prep.b).

constitutive and non-constitutive features—independent of the fact that it is unclear how to offer a satisfactory account of this distinction.

I will endorse a further possible position—*moderate holism*, which does not assume localism, while avoiding to slide into radical holism. Boghossian's meaning realism is actually a meaning monism—he assumes that each expression has one precise and objectively given meaning. My rival position is to assume that some concepts can be individuated in different ways, so that one term can have more than one meaning at the same time. The idea is that a particular term may be viewed as corresponding to a single concept (which is ascribed to every person from a whole scientific field). But at the same time, we can legitimately individuate in a more fine grained manner, i.e., this term can also be considered as corresponding to two or several concepts (so that each of these concepts is attributed to a smaller group of persons only). The reason is that there are different philosophical and explanatory interests that underlie a particular study of the change of a scientific term. These interests determine how a concept is to be individuated; and as the same term can be subject to different philosophical studies and theoretical interests, its content may be individuated in different ways. Thus my account disagrees with the existence of a unique and determinate relation of synonymy and consequently with Boghossian's monist meaning realism. Nevertheless, this does not mean that my account is a meaning anti-realism. For once we specify the particular interests that underlie an instance of concept ascription, the meaning ascribed is determinate and objective. My position is best viewed as a pluralism about meaning.

Moderate holism

Let us define the *total conceptual role* of a term as the total set of inferences which this term occurs. If we assumed that the meaning of a term were its total conceptual role, then we would

end up with radical holism. Since two persons hardly ever agree on every inference in which a term occurs, every person would actually associate a different concept with this term. So no distinction between belief and meaning would be made—every change in the total conceptual role would be a change in meaning but never simply a change in belief, and it appears impossible that two persons could actually disagree. Thus a second step has to follow that avoids radical holism and its identification of conceptual content with total conceptual role.

The strategy is to say that two persons share the same concept as long as their total conceptual roles associated with a term are sufficiently similar. The function that assigns a meaning to every conceptual role is not a one-one mapping, instead different total conceptual roles count as the same concept. On this account, meaning supervenes on total conceptual role; and we have a holism about *meaning determination* in that the supervenience basis that determines meaning is holistic. But this does not entail radical holism about *meaning individuation*. I call this approach, that allows for shared concepts and a distinction between meaning and belief, *moderate holism*. Critics of holism such as Fodor and Lepore (1992) and Devitt (1993a) actually criticize radical holism, but this position is somewhat of a straw man. Michael Devitt (1993a) refers to Gilbert Harman and Ned Block as radical holists, whereas Harman (1973) and Block (1986) very clearly state that they want to replace the standard notion of 'sameness of meaning' with the idea of 'similarity of meaning'. Many meaning holists appear to have some sort of moderate holism in mind.

So far my very definition of moderate holism is compatible with Boghossian's localism. Boghossian does not have an account as to how to draw the distinction between meaning-constitutive and other inferences (he simply assumes its existence based on his monist meaning realism), but others have proposed to define the meaning-constitutive inferences as the reference-

determining inferences (Devitt 1993b). Let me give a quick argument why I do not think that we can get a real localism in this way. As Philip Kitcher (1978) has convincingly argued, the reference of a scientific term may change from token to token. For instance, the term 'phlogiston' as used by the phlogiston chemist Priestley was sometimes non-referential (nothing satisfies the associated description). On other occasions, for instance when Priestley described the effects of him breathing 'dephlogisticated air', it referred to oxygen (in a causal fashion). A theory of concepts that assumes that a concept is defined by a clearly delimited set of reference-fixing conditions cannot account for this reference change from token to token. Moderate holism explains this by assuming that a term is connected with a large and relatively open set of beliefs that can influence reference, and that in a particular context greater weight is given to a certain set of beliefs so that reference is determined in this particular way (Jackman, unpublished).[2]

This was an admittedly sketchy argument, but the burden of proof is on those who endorse localism or an analytic-synthetic distinction. At any rate, my paper is not primarily concerned with offering arguments against localism. Instead, the project is to show how it is possible to use a conceptual role semantics of concepts while endorsing neither localism nor radical holism. My main question is as follows: given a scientific term, does it corresponds to one or several concepts, and in what manner? We need an account that enables us to tell whether a change in a scientific term in the course of history was so substantial that the term now has a different

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[2] Another suggestion of localists is to characterize the meaning-constitutive inferences as those inferences that are viewed as counterfactually supporting (Sellars 1948, Haas-Spohn and Spohn 2001). I do not think that this approach can yield an analytic/synthetic distinction, but in this paper I cannot offer a detailed argument for this claim.

meaning, or whether at some point in history a concepts splits into two or more concepts used by different scientists or in different scientific fields. Block (1986) offered the interesting suggestion that we should replace the dichotomy between same and different meaning by an account of similarity of meaning on different dimensions. However, this proposal is of no help as long as we do not have a clear idea of the postulated dimensions of meaning.

My approach addresses this issue by assuming that there are different ways to individuate a concept. Depending on our philosophical interests, we can view a term as corresponding to one or several concepts, i.e., ascribe a concept to larger or smaller group of persons. As an analogy, take dialectology—the field of linguistics that is concerned with the study of dialects. Our folk conception is that dialects have distinct boundaries and that together they make up the language of which they are dialects. However, linguists are well aware of the fact that there is no principled distinction between a 'mere' dialect and a 'real' language (Francis 1983). Instead, linguists start out with the idiolect of persons and study the interpersonal variation of idiolects. Then certain collections of more or less similar idiolects are considered as dialects or languages, but "in an essentially ad hoc manner" (Chambers and Peter Trudgill 1980, p. 5), as no unique notion of language (as opposed to dialect) is available. This is often viewed as an advantage, because in each case of delineating a particular dialect one can precisely spell out the linguistic features that pick out this dialect and defend this particular choice of individuation criteria—without being committed to use these criteria in every case. In a similar vein, I do not assume that there is a unique and principled distinction between real concepts and mere variants of a concept. Starting with the total conceptual role of a term endorsed by an individual (the 'idiolect' of this person), we can study the interpersonal variation in conceptual role. This variation tends to be grouped around certain poles or in certain clusters, and we can pick out one of these

clusters and consider it a concept. Such a choice is fruitful as long as it fits some of the philosophical interests that can underlie a particular study of conceptual change. As there are different possible explanatory interests, different ways of individuating concepts can be legitimate.

Even though a particular choice can be defended and yields a notion of synonymy, this notion of synonymy is post facto and relative to the choice. I do not assume that there is a pre-established rule (or notion of synonymy) that prescribes in advance of the particular case how we have to individuate; this is why my approach is a moderate holism rather than a genuine localism. But it is not a meaning anti-realism, because the clusters picked out as concepts are as real as the interpersonal variation itself, and a particular way of individuating is justified as long as this particular account of content yields a philosophically successful study of the change of the term under consideration. The following section will illustrate and partially defend my account by applying it to a real case—the gene concept.

The gene concept(s) and the study of conceptual change

I will argue that there are (at least) two ways to individuate the gene concept as used in Mendelian genetics. Our first philosophical interest is to *study the progress* that occurred in the transition from Mendelian to molecular genetics. This means to contrast 'the' Mendelian gene concept with 'the' molecular gene concept such that we have an instance of conceptual progress. Since in this case we ascribe the same gene concept to every Mendelian geneticists, we have to abstract from the differences in beliefs about Mendelian genes. Mendelian geneticists widely disagreed about the material nature of the gene. Some biologists endorsed the view that a gene is a clearly delimited part of the chromosome; others assumed that genes are physiological states of

the cell or abstract entities. We abstract from those inferences about the material nature of genes and do not view them as meaning-constitutive for the concept of the Mendelian gene. Instead, the Mendelian gene is a sort of functionally defined entity. It is a genotypic entity that is characterized by its effect on the phenotype, such as certain Mendelian patterns of inheritance obtained in breeding experiments. The existence of Mendelian patterns of inheritance and mendelizing phenotypic traits was the crucial evidence for the existence of Mendelian genes. Whatever the material nature of genes, Mendelian geneticists agreed on the fact that patterns of inheritance are to be predicted and explained by the inheritance of genes from the parents. To be sure, the understanding of the behavior of Mendelian genes needed to be modified once exceptions to the simple patterns of inheritance became clear. Geneticists did refine their views about the characteristic features of genes. But these changes in the conceptual roles endorsed by various biologists during the history of Mendelian genetics took place within the boundaries of the cluster concept of 'the' Mendelian gene.

Mendelian geneticists knew that the relation between genes and traits is many–many. They could not explain the development of a particular trait, because the large set of genes involved in a structure were unknown. But at least they could predict a phenotypic *difference* (a mutant phenotype) based on a genotypic *difference* (a mutated gene). In this sense Mendelian genetics could actually explain phenotypic *differences* by means of genotypic *differences*. However, Mendelian geneticists had no idea about how genes bring about their effects. So a real causal or mechanistic explanation of characters by genes was impossible. This is the achievement of molecular genetics. While beliefs about the material nature of genes are not constitutive of the Mendelian gene concept, they are essential for the molecular gene concept. The conceptual role of the molecular gene concept includes inferences about the way in which the structure of DNA

interacts with other molecular substances to synthesize its products. Molecular biology explains by means of the way in which various substances interact in mechanisms based on their structure-function relationships. The molecular gene concept embodies explanatory principles and schemata about processes in which genes figure. The crucial point for our purposes is that the Mendelian gene *concept* as such cannot yield these explanations (even if the entity referred to by this concept is the material substance that is responsible for the phenomena molecular biology investigates), because the conceptual role of the Mendelian gene does not include a specification of the structure of genes and the way it functions in molecular mechanisms. While the Mendelian gene concept can explain phenotypic differences by means of genotypic differences, only the molecular gene concept supports a direct explanation of (cellular) characters by means of genes. Thus we get a clear sense of explanatory progress that occurred in the transition from the Mendelian to the molecular gene.

This account of the Mendelian gene concept was guided by the aim of contrasting it with the molecular gene concept in order to discern conceptual progress. Philosophers of biology often view the relationship between the Mendelian and molecular gene concept in this way (Waters 1994), even though these accounts are not based on a theory of conceptual content. Historians of biology, however, are often dissatisfied with this minimalist construal of the Mendelian gene, which characterizes it in functional terms only. The reason is that this account does not make intelligible why Mendelian genetics developed in a certain way and how molecular genetics could grow out of it in the first place. Many Mendelian geneticists had strong views about the material nature of genes. These differences explain why these biologists chose to side with different research approaches and conduct different experiments. The exceptions to standard Mendelian patterns of inheritance that became known due to linkage, position effects, or variable

expressivity, yielded insights into the structure and function of Mendelian genes and provided important clues for further experimental research. 'The' Mendelian gene concept as construed above abstracts from all these relevant differences. Thus if we are interested in *explaining theoretical change*, we have to make use of a more fine-grained scheme of individuation. Now we have to discern *several* Mendelian gene concepts, each of which embodies certain relatively specific views about the structure and function of genes. Each of these concepts was possessed only by a subset of Mendelian geneticists, and some individuals changed from one concept to another in their scientific career. This permits us to track the development of Mendelian genetics in a more fine-grained manner, and it puts us in a position to explain why certain historical developments occurred with reference to the different gene concepts used by different research groups.

Conclusion

Based on a moderate holism, I argued that concepts can be individuated in different ways. We can delineate a minimalist Mendelian gene concept that does not make reference to the material nature of genes and is ascribed to all Mendelian geneticists. But we can also delineate more specific Mendelian gene concepts that are shared only by particular research groups. Thus the term 'gene' as used by a particular geneticist can be viewed as corresponding to two different concepts at the same time. This claim is not to be construed as an indeterminacy of meaning that is intended as a reductio of the very notion of meaning. Instead, I emphasized the philosophical interests that underlie a particular study of conceptual change, and which determine how we have to individuate in a particular case. Not every possible explanatory interest may be relevant for a particular case; and different ways of individuation need not obtain for every scientific term. But

as there are some terms that can be subject to different philosophical studies and explanatory interests such that we have to individuate concepts differently, we still obtain a pluralism about meaning. Apart from conceptual change in science, I think that a similar situation also obtains in the psychological study of individual development. Debates among developmental psychologists about when children acquire 'the' (adult) concept of 'object', for example, may be due to the fact that different concepts of 'object' can be used. But this is a topic for another paper.

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