

Characterizing individuals: the role of the formal

It seems that there is some incongruence between the fact that ontology may be studied both from a restricted point of view, relative to some scientific theory, and also from a general point of view, as somehow the ontology of “the world”. The local features of the world should be precisely those that are also general features of the world. But then how might one reconcile the local aspects of the study of individuality present in the metaphysical study of scientific theories with the globalizing demands of traditional metaphysics? We could hope that a final scientific theory would give us the clues for a final ontology of the world, and so our problems would be reduced to understand what those features are. While no such a theory appears, however, all our efforts must concentrate on actual scientific and metaphysical practice. We propose that one may see a relationship between both kinds of investigation by considering that the ontological work on scientific theories encodes ontological presuppositions of a general character induced by the metamathematical framework employed to render rigorous the formulation of the theory. In fact, our point is that scientifically guided study of individuality brings some often overlooked presuppositions of a metaphysical nature hidden in the formal apparatus underlying scientific theories. As a first point to be considered, let us concede that practically all of contemporary discussion employs without further justification classical logic and set theory (ZFC). This choice of the underlying formal apparatus may commit us with a theory of identity which may be seen as encompassing an ontology of individuals: within such a framework, *every entity is an individual*, in the sense of having precise identity conditions. Thus, attempts to consider *non-individuals* or merely discernible entities (without individuality) fail *by fiat*. Really, to endow every entity with precise identity conditions is already a heavy metaphysical choice. Even though no particular claim is being made as to the precise nature of the individuals, the entities in question are individuals nonetheless. That is, there is still space for disagreement as to whether the individuality of those entities is grounded on a substratum, on bundle theories or simply taken as a primitive notion. The fact is that some features of classical logic and set theories allow one to individuate every entity of the domain of discourse. Now, consider non-relativistic quantum mechanics. This theory is consistent with an interpretation according to which its entities are not individuals in the sense mentioned above. So, why to assume they have identity conditions to begin with? Should we not make those assumptions explicit and link them with the relevant metaphysical issues? To be sure, set theories such as ZFC allow us to deal with some counterfeit non-individuals, understood as entities without identity conditions, with the additional feature that they may be indiscernible one from another, as quantum entities would have to be in some circumstances. As is well-known from the literature, when we confine ourselves to certain set theoretical structures (as scientific theories are considered to be, according to an influential view), we may simulate non-individuality and indiscernibility of the elements comprising its domain. There are distinct ways to achieve that result; one of them, known as “Weyl’s thesis” consists in taking the equivalence classes of the elements of a structure modulo some equivalence relation. In that framework, we deal only with the cardinality of the distinct classes, not taking into consideration their precise nature and their identity. But that works only as long as we keep ourselves restricted to the particular structure we are taking into consideration. Looked from the point of view of the whole theory in which the structure itself is embedded (ZFC), the entities it deals with do have identity conditions, and identity is defined

for them. More than that, in classical ZFC set theory one can prove the following result: every structure may be extended to a rigid structure. In a rigid structure every entity may be distinguished somehow from any other (in a technical language, there is only one automorphism on the structure, the identity automorphism). As a second point to be considered, we must take into account the fact that other non-classical set theories such as quasi-set theory, on the other hand, may leave some of those presuppositions behind (although it commits itself with other ones). Really, one may choose to begin with non-individuals instead of individuals, entities for whom identity is not a defined notion. So, in this case there is no simulating non-individuality, no rigid structures. The choice between the preferable logic and set theory (or formal apparatus in general) to deal with a theory may be seen as expressing general ontological commitments. In fact, we believe that such very general ontological presuppositions should come expressed in the very apparatus we are using to state the theory rigorously. That would show how a very general kind of investigation in the field of ontology may be combined with the specific investigation of scientific theories. Each particular theory may be compatible with very different kinds of ontology, but not every formalism expresses those commitments in a clear and transparent way.