Constructional Ontologies. Metaphysical Dependence and its Puzzles

Jacopo Berneri[1]

[1]IFIKK (University of Oslo), Blindernveien 31, Oslo, 0313 , Norway

Abstract

The discussion surrounding metaphysical dependence in foundational ontology and, more in general, in philosophy is intricate and has been ongoing for a long time. In this work I outline how, by considering a few reasonably uncontroversial assumptions, the constructional approach provides a precise and intuitive understanding of dependence. This refocusing allows for a formal regimentation of dependence and offers a resolution to certain puzzling circularities apparently associated with this notion.

Keywords

Metaphysical dependence, constructional ontology, set theory, propositions

An entity *metaphysically depends* on another when, intuitively, it exists in virtue of the other. For example, the set of a and b, $\{a, b\}$, depends on a and b, for, if they did not exist, the set would not exist as well or, equivalently, $\{a, b\}$ cannot exist without a and b. However, behind this apparent clarity, the debate in philosophy and formal ontology around dependence is complex and long-standing[1]. This is mostly due to three reasons.

(i) Many dependence claims are commonly discussed in various fields of metaphysics, like set theory and mereology, but the task of articulating a comprehensive and overarching theory of dependence has proven to be challenging. (ii) There is a plethora of *senses* in which a thing depends on another. For example, an object x *rigidly* depends on another object y if and only if x exists in virtue of a specific y, such as {Socrates} cannot exist without Socrates. On the other hand, the existence of x may also require the existence of an object of a certain kind. As an instance, electricity cannot exist without electrons, though no specific electron is required for its existence. For this reason, philosophers often argue that electricity *generically* depend on electrons. (iii) Several proposals to *define* dependence are available on the philosophical market. Just to mention a couple of examples, one may be attracted by the modal account, according to which a thing depends on other if and only if necessarily if the former exists, then the latter exists. Alternatively, maybe inspired by Kit Fine, we may propose a definition in terms of the notion of essence: x depends on y if and only if x is essentially such that it exists only if y does. However, there is no consensus.

I argue that such complexity can be avoided by changing the point of view from which the notion of dependence has been investigated so far. This refocusing consists in two assumptions.

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jacopo.berneri@ifikk.uio.no (J. Berneri)

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[1]It is common in contemporary literature to use the labels “metaphysical dependence” and “ontological dependence” as synonyms. From now on, I will use “dependence” as a shorthand for “metaphysical dependence”.

Firstly, the inquiry should take place within the constructional approach originally introduced by Kit Fine in "The Study of Ontology" (1991), in which entities are constructed in stages by the application of appropriate constructors to available objects. As it is well-known, one prominent example is the iterative conception of set. Within the metaphysical framework just sketched, dependence acquires a clear and intuitive meaning, which can be summarized by the following statements. There are some "givens" from which the constructive process begins, namely they do not depend on anything. On the other hand, if an entity is not a given, then it is constructed at the relevant stage exploiting available entities. Hence, in this case, the former depend on the latter.

Secondly, I restrict the domains of inquiry in which dependence is supposed to play a role. In fact, the broad applicability of the constructive approach to various ontologies poses challenges in terms of formalizing dependence. For this reason, I will focus on the investigation of the construction of *sets*, as it is commonly described in the iterative conception of set, and the construction of *structured propositions*, that is propositions conceived as complex entities having as parts the semantic values of expressions in the sentences expressing them. Sets are constructed from zero or more objects available at the relevant stage, while for propositions I introduce an operation of *structural composition* taking available objects and properties as inputs and giving structured propositions as outputs. In a nutshell, structured propositions are built up combining objects and properties available at the relevant stage.

This assumptions allow me to articulate a formal regimentation of the central notion of dependence. A particularly valuable aspect concerns its logical properties. In general, it is not clear what properties dependence should satisfy. For example, there is a sense in which dependence must be reflexive: everything depends on itself, because the existence of any object is a necessary and sufficient condition for it to exist. On the other hand, this statement seems trivial: we expect dependence to play an informative role in our formal ontologies. Now, I argue that the framework I am committed to clearly establishes a dependence structure ordering sets and propositions in a *strict partial order*. Essentially, when the construction of sets and propositions I sketched is in place, nothing depends on itself, and the relations of priority conveyed by dependence are asymmetric.

Further, my approach allows me to bring some, much needed, clarity to the current debate about the application of dependence to sets and propositions. In particular, I articulate two important dependence principles. Firstly, if a plurality of objects xx is used to construct a set, then it depends on xx. This claim admits two readings depending on a collective or distributive interpretation of plural predicates. Accordingly, with these readings in place, it is easy to distinguish between *partial* and *full* dependence. In the case of sets, $\{xx\}$ fully depends on all and only its members represented by the plurality xx, but it only partially depends on each object x among xx.

The second principle captures the tight link between dependence and the notion of *aboutness*. In the metaphysics of propositions it is often held that a proposition p is about x if and only if p ascribes a property to x. But, intuitively, propositions cannot exist without the objects they are about. For example, the proposition "Socrates is wise" is about Socrates, since it clearly ascribes the property of *being wise* to him. But this proposition cannot exist without Socrates. So, if a proposition p is about an individual x, then p depends on x. At a closer look, the application of dependence to structured propositions allows the formulation of an even more general claim:

with the structuralist view in place, propositions depend not just on the individuals they are about, but also on the properties they ascribe. In general, propositions (partially/fully) depend on their components.

However, the notion of dependence so formalized is apparently threatened by some paradoxical circularities. The most remarkable case concerns a proposition about a set of which it is an element. Indeed, if we admit that propositions can be about sets, then it is natural to think that some propositions can be members of the set they are about, as in the case of λ:

λ: $\{\lambda\}$ is F

Applying the dependence principles mentioned above, λ depends on its singleton, which in turn depends on its unique element, i.e. λ itself. But this contradicts the requirements of irreflexivity and asymmetry. Thus, the theory of dependence I argued for seems self-defeating. My proposal is that the theory may be retained, provided that these circularities are interpreted as outcomes of a non-regimented constructive process of propositions. Let me explain.

I claim that λ cannot be constructed. For λ to be constructed, $\{\lambda\}$ should be available at the relevant stage, since λ is constructed ascribing a property to a metaphysically prior object, namely its singleton. But this set is not available, because $\{\lambda\}$ is in turn the result of applying the set-forming operation to λ itself. The unavailability of $\{\lambda\}$, then, justifies the fact that the *sentence* "$\{\lambda\}$ is F" does not express a proposition. This argument is analogous to the justification of why Russell's set does not exist in the iterative conception of set. Just as in set theory it is not true that every predicate corresponds to the set of all things satisfying it, similarly, in light of the constructive approach, it is not the case that every sentence expresses a proposition.

In conclusion, the constructional approach as a foundational ontology is fruitful for philosophers, logicians, and formal ontologists interested in the clarification of the notion of metaphysical dependence. Through a philosophical and logical investigation, I clarify the concepts of fundamentality and priority typically associated with dependence, without reducing them to more basic ones, such as essence, or to cognate notions, such as grounding. This approach allows me to effectively address certain challenges in the contemporary debate in foundational ontology.