WHY IDENTITY IS FUNDAMENTAL

Otávio Bueno

1. Introduction

Identity is arguably one of the most fundamental concepts in metaphysics. There are several reasons why this is the case: (a) Identity is pre-supposed in every conceptual system: without identity, it is unclear that any conceptual system can be formulated. (b) Identity is required to characterize an individual: nothing can be an individual unless it has well-specified identity conditions. (c) Identity cannot be defined: even in systems that allegedly have the resources to define identity. (d) Identity is required for quantification: the intelligibility of quantification pre-supposes the identity of the objects that are quantified over. These are only four considerations in support of identity’s fundamental role. In this paper, I examine and defend them.

I then examine a challenge that has been raised against identity’s fundamentality: one from the metaphysics of physics—based on a significant interpretation of non-relativist quantum mechanics—according to which certain quantum particles lack identity conditions. After responding to this challenge, I consider the nature of the commitment to identity, and argue that it turns out to be very minimal. In fact, a very deflationary form of metaphysics can accommodate it. In arguing that identity is fundamental, one need not overstep the boundaries of even a very minimal empiricist metaphysics. Or so I argue.

2. Identity and Fundamentality

Identity is fundamental in at least four different ways. I’ll consider each in turn.

2.1. Identity is pre-supposed in all conceptual systems. The most basic feature of concepts is to demarcate certain things from others, to draw a line between those things that fall under that concept and those that don’t. (In fact, identity is presupposed even in those systems that cannot express it. I’ll return to this point below.)

Concepts are used to classify objects, to make distinctions among them, and to group them together. The classification involves demarcating objects: lumping them together as falling under the same concept, or separating them from objects that fall under different concepts. Both features of classification demand identity. To specify certain things as different requires, of course, that the objects under consideration be different—that is, not identical—in the relevant respect. To lump certain things together requires that they fall under the same concept—which pre-supposes the identity of the concept under consideration. Alternatively, if the things in question...
are just similar, they need to be the *same* with respect to at least some of their characterizing properties (that is, the properties that specify the kind of thing they are). In this respect, identity is presupposed even when the relevant concepts involve only similarity.

It may be objected that a conceptual system is not part of one’s metaphysics, and thus has no place in assessing identity’s fundamentality. The complaint is fair, but it doesn’t go very far. After all, the practice of metaphysics requires concepts, and they, in turn, bear appropriate relations to the world, whose fundamental features the relevant metaphysical theories aim to describe. So if identity is needed to formulate concepts, given the very nature of concepts, and since concepts are needed to do metaphysics, metaphysics requires identity. Identity’s fundamentality is therefore crucial.

This point can be made in a different way. The relation of falling under a concept is a form of predication, which has as its metaphysical counterpart the fact that objects have certain properties. If the specification of these properties is done with uniqueness—so that a single particular is uniquely determined—we have an individual. Thus, we move from concepts and predicates to properties and individuals. Identity is crucial not only for the conceptual part, but also for the corresponding determination of the individuals in question.

2.2. Identity is required for the specification of individuals. There are different ways of conceptualizing individuals. (Gracia 1988 provides a systematic and insightful discussion of individuality; see also Lowe 1998; and French and Krause 2006.) It is reasonable to expect that individuals should satisfy minimally, at least, two conditions: (i) they are distinguishable from other things (distinguishability condition), and (ii) they can be re-identified (re-identification condition).

As will become clear, these conditions are not uncontroversial, but they seem to capture important features of individuality. The distinguishability condition highlights the fact that an individual can be, at least in principle, distinguished from others, which are *different* from it. The re-identification condition, in turn, emphasizes that the *same* individual can be singled out and uniquely determined.

Both conditions require identity. The distinguishability pre-supposes that an individual be *different* from other particulars, and this fact allows it to be distinguished from them. The re-identification condition pre-supposes that an individual remains the *same*, and this fact allows it to be identified again. In light of these conditions, identity is a crucial feature for something to be an individual.

But are these conditions appropriate, even as a minimal characterization of an individual? It may be maintained that they are not. Jorge Gracia (1988, chaps. 1 and 6) compellingly argues that there is a distinction between individuality and distinguishability. Hence, in particular, distinguishability should not be a requirement for individuality. Individuals cannot be instantiated, as opposed to their attributes (thought of as universals), such as distinguishability. Individuality is concerned with a particular individual alone, independently of any relations it may bear to other entities. In contrast, distinguishability is fundamentally relational in nature: it involves the relation of an individual with other particulars, which ultimately allows all of them to be distinguished from each other. As Gracia (1988) notes, if we consider a possible world in which there is only one object, this object cannot be distinguished from other objects, given that there are no additional ones, but clearly it can still be taken to be an individual. Thus, distinguishability and individuality should be kept apart.

It turns out that this example, of a possible world with only one object, is not unprob-
lematic. After all, on a fairly common conception of possible world, the specification of a world requires the determination of a spatio-temporal background. And given this background, it is not so easy to separate conceptually individuality and distinguishability since the single object now bears relations to the underlying spatio-temporal background, and can be distinguished from the underlying spatio-temporal regions (see French and Krause 2006, p. 6n8; and Hacking 1975).

This response, however, assumes a particular conception of possible world, according to which a world has a spatio-temporal structure. As is well known, David Lewis has provided the most thorough defense of this conception, taking worlds to be maximally connected spatio-temporal objects (Lewis 1986). On this view, worlds are concrete entities. But this is not the only available conception: worlds can also be thought of as abstract objects (see van Inwagen 1986). In fact, a Wittgensteinian conception of world, according to which the world is everything that is the case, clearly illustrates this alternative (Wittgenstein 1922). On this conception, worlds do not have a spatio-temporal structure, and are abstract in nature. Can this conception of world accommodate the possibility of a world with a single object in it?

It may be thought that a single object could not constitute a Wittgensteinian world. But it is unclear why this would be so. If the world is everything that is the case, this doesn’t rule out the situation in which there is only a single object: it is just that, in a situation like this, everything that is the case may not amount to a lot.

Leaving this issue aside, there would still be distinguishing features in such a world. If the single object has well-defined identity conditions, it has the modal property of being distinguishable from an object that could have existed in that world. If such an object lacks well-defined identity conditions, it has the modal properties of being indistinguishable from other objects of the same kind that could have existed in that world and being distinguishable from objects of a different kind that could have existed there. The equivalence class of possible indistinguishable objects is distinct from a class of possible distinguishable objects. Needless to say, identity is crucial throughout to make sense of these differences. As a result, even on a Wittgensteinian conception of world, the connection between individuality and distinguishability is not so easily broken.

I should note that Steven French and Décio Krause (2006) are ultimately sympathetic to Gracia’s point (see, e.g., French and Krause 2006, pp. 207, 210). Interestingly, by separating individuality and distinguishability, one could entertain the possibility of individuals that are indistinguishable from one another. This would put some pressure on a crucial aspect of the theory that French and Krause develop for non-individuals (2006, chaps. 1, 3, 4). On their view, based on an influential interpretation of non-relativist quantum mechanics—favored, in particular, by Erwin Schrödinger and Hermann Weyl—it does not make sense to apply identity to quantum particles. An electron, for instance, is not something that could be individuated: one could not determine that the same electron has been detected twice. To do that, one would need to re-identify such an electron, but it is unclear how this could be done even in principle. According to quantum mechanics, the permutation of electrons does not change the states they are in. Thus, such permutation is not observable, according to the theory. And there is no way to single out and individuate a given electron. As a result, the interpretation goes, electrons (and other quantum particles) are best understood as non-individuals.
Now, consider certain things—to use a generic term that does not pre-suppose whether one is dealing with individuals or not—and suppose that, similarly to quantum particles, they are indistinguishable. This fact, however, does not entail that these particles are non-individuals. But the entailment would go through if individuals were characterized in part, as suggested above, by their distinguishability. Thus, to ensure that quantum particles are non-individuals, French and Krause need an additional assumption: they need to stipulate that identity is not defined for such particles in order to infer that these things are non-individuals. This additional commitment regarding lack of identity for quantum particles is required. This additional commitment is not needed if distinguishability is a condition for individuality. In this case, the lack of distinguishability for quantum particles would be enough to entail their non-individuality. (I’ll return to non-individuals in quantum mechanics below.)

Even if these considerations are off the mark, and individuality and distinguishability should be kept apart, the central point remains: identity is still required to make sense of individuals. For in the case of a world in which there is only one individual (however such a world is ultimately thought of), to be an individual, that object needs to be identical to itself, so that the object is what it is rather than something else. If identity does not apply to such an object—not in the sense that the object in question is different from itself, which would be clearly incoherent, but in the sense that identity is not defined for such an object—then it is not obvious what would make the object an individual rather than just an indistinguishable thing (indistinguishable from any other thing of the same kind, whatever it is). In either case, the link between identity and individuality is very close.

2.3. The indefinability of identity. Identity cannot be defined, even in systems that allegedly provide such “definitions.” It is often claimed that identity can be defined, provided the expressive resources of the language in use are powerful enough. For instance, in a second-order language, which allows one to quantify not only over objects, but also their properties and relations among them (see Shapiro 1991), identity can allegedly be defined as follows:

\[ x = y \text{ if, and only if, } \forall P (P_x \leftrightarrow P_y). \]

Intuitively, \( x \) and \( y \) are identical just in case \( x \) has a property as long as \( y \) does (and vice-versa), for every property. On the surface at least, the right-hand side conditional does not seem to involve identity, but only quantification over properties. So it does seem that identity is indeed being defined.

Appearances, however, are often deceptive. For identity is clearly pre-supposed in this definition, given that the variables occurring on the left-hand side of the bi-conditional need to be the same as those occurring on the right-hand side (McGinn 2000); otherwise, the expression will not convey its intended meaning. Clearly, \( x \) and \( y \) cannot be said to be identical if two different objects, \( z \) and \( w \), have the same properties. It is, thus, crucial that the same variables occur in both sides of the bi-conditional. But, in this case, rather than being defined, identity is, in fact, presupposed by the statement that supposedly defines it. In the end, identity is too fundamental to be defined in some more basic terms.

It may be argued that identity is relative to a given language. In fact, in some languages, identity cannot even be expressed. Thus, it cannot be the case that it is fundamental. But this response is not right. Certain languages—particularly formal ones—are indeed impoverished enough so that identity cannot be expressed in them. But this doesn’t mean that identity is not presupposed. Consider, for instance, classical propositional logic, and let’s
grant, for the sake of argument, that a proper concept of identity cannot be introduced in the context of the corresponding propositional language. It is still crucial, however, that identity be assumed. Otherwise, if the two occurrences of the propositional variable $A$ in $A \lor \neg A$ were not of the same variable, we would end up with a contingent statement rather than a tautology.

This point clearly carries over to all tautologies and logical truths that are grounded on relevance considerations—that is, the premise and the conclusion share at least one variable, which has to be the same variable in each case. Once again, despite not being definable, identity is presupposed for the proper use of the relevant language and to guarantee the intended inferential relations. This highlights another aspect of identity’s fundamentality: it is presupposed for the proper intelligibility of logical truths and formal validity.

2.4. Identity is required for quantification. At least in classical logic, quantification requires the identity of the objects that are quantified over. For instance, consider the inference from an arbitrary $a$ that is $F$ to every $a$ is $F$. Of course, in this case, we need to assume that $a$ is arbitrary and does not occur free in $F$; under these conditions, we then have that:

$$Fa \vdash \forall x Fx.$$ 

This inference is an expression of the fact that if each object in the domain of quantification is $F$, then every object in the domain is $F$. However, this holds only if each distinct object in the domain is in the range of the universal quantifier. For if the same object were repeatedly quantified over, and if in each case it were $F$, there would be no support for the conclusion that every object is $F$.

Moreover, the notion that $a$ is arbitrary should have a substantive inferential force: it needs to entail that there is no object in the domain, different from $a$, that is not-$F$. After all, if there were such an object, it would be false that every object in the domain is $F$. The requirement that the object in question be different from $a$ emerges from the consistency of the domain: the arbitrary object $a$ that is supposed to be $F$ had better not also be not-$F$, otherwise the domain would be inconsistent, with $a$ being both $F$ and not-$F$. This suggests that, at least in classical logic, quantification requires identity of the objects that are quantified over.

This point can also be highlighted by noting that it is a theorem of first-order classical logic with identity that $\forall x x = x$. Needless to say, the identity of the objects that are quantified over in this instance is clearly assumed. There has been, however, an important challenge to the idea that identity applies so broadly, and if this challenge is right, some restrictions are needed in the scope of any such quantification. I’ll consider it now.

3. A Challenge: Failure of Identity in Quantum Mechanics?

As noted above, according to a significant interpretation of non-relativist quantum mechanics, identity is not defined for quantum particles. French and Krause (2006) developed a formal framework (in terms of a quasi-set theory) that allows one to accommodate mathematically the non-individuals that are posited. As a result, identity—at the fundamental level—has to be restricted, since it doesn’t apply universally.

In light of the considerations above that favor the fundamentality of identity, one may wonder about the intelligibility of a quantification that does not pre-suppose the identity of the things that are quantified over. In particular, without pre-supposing the identity of what is quantified over, existential and universal quantification end up collapsing. One can always infer, without any restrictions, from $Fa$ that $\exists x Fx$, since
the fact that $a$ is $F$ guarantees that something is $F$. But without identity in place, the key restriction of the inference from $Fa$ to $\forall xFx$, namely that $a$ is arbitrary—in the sense that no object different from $a$ is not-$F$—is not available. As a result, one is led to conclude from the fact that $Fa$ that $\forall xFx$, which is clearly invalid. Even if non-individuals may be such that what holds for one of them holds for all of them, presumably one should still keep the existential and the universal quantifiers apart.

In response to this objection, perhaps one could insist that quantification over quantum particles is such that although there is a certain number of them—there is a cardinal associated with a collection of these particles—there is no way of identifying them—so the relevant collection does not have an ordinal (French and Krause 2006). In other words, although there might be, say, five particles in a given region (so the cardinality in question is well defined), there is no way of specifying the first particle, the second, the third, and so on (thus, the relevant ordinal is not determined). Moreover, the argument goes, all that is needed for quantification is the cardinality of the relevant collection.

In fact, in the case of quantum particles, a procedure could have been devised to measure the cardinality of these particles, without allegedly pre-supposing that they have an ordinal. Domenech and Holik (2007) describe this procedure as follows:

For example, we could count how many electrons has an Helium atom imagining the following process (perhaps not the best, but possible in principle). Put the atom in a cloud chamber and use radiation to ionize it. Then we would observe the tracks of both, an ion and an electron. It is obvious that the electron track represents a system of particle number equal to one and, of course, we cannot ask about the identity of the electron (for it has no identity at all), but the counting process does not depend on this query. The only thing that cares is that we are sure that the track is due to a single electron state, and for that purpose, the identity of the electron does not matter. If we ionize the atom again, we will see the track of a new ion (of charge $2e$), and a new electron track. Which electron is responsible of the second electron track? This query is ill defined, but we still do not care. Now, the counting process has finished, for we cannot extract more electrons. The process finished in two steps, and so we say that an Helium atom has two electrons, and we know that, as the wave function of the electrons is an eigenstate of the particle number operator, no problem of consistence will arise in any other experiment if we make this assertion. (Domenech and Holik 2007, p. 862)

The problem, however, is that in this procedure, the identity of the relevant particle is still assumed. For, when the atom is ionized for the second time, “we will see the track of a new ion (of charge $2e$), and a new electron track.” But if the track is of a new ion, and if it is a new electron track, it is assumed that we are not extracting the same electron; otherwise, we should have counted just one electron rather than two. Thus, in the end, the identity of the electrons that are quantified over is pre-supposed even in a procedure designed to show how quantification without identity is possible.

Identity is such a fundamental concept that it is very difficult to see how one can avoid it. If the best case for the non-applicability of identity to quantum particles ultimately pre-supposes the identity of these objects, perhaps identity is indeed a logical notion after all. It is a concept that has the same (!) extension in every interpretation, as one would expect from a logical concept.

4. Identity, Fundamentality, and Deflationary Metaphysics

Despite being fundamental, identity is not substantive: it is a property every object has and it has only to itself. Identity need not be
taken as something metaphysically substantive. What may have some more content are particular principles of individuation, since they may incorporate (on a substantive understanding of them) particular metaphysical assumptions.

It may be argued, as empiricists since David Hume (1738/1985) have argued, that identity is nothing but a projection that creatures like us have a tendency to make, quite independently of whether the things to which identity supposedly applies actually have such identity conditions. In this sense, for all we know, identity may be an illusion (Krause and Becker 2006). The transient nature of things around us may suggest that in the physical world, identity can only be applied to a temporal slice of an object. For minute changes in that object a moment later prevent it from being strictly identical to its past slice. In this way, the physical world is too transient for objects to preserve their identity over time. (For an insightful examination of persistence conditions for objects, see Hawley 2001.)

The considerations above suggest that identity is ultimately needed if we are to make sense of objects. But nothing requires that identity be a property that these objects have over time. It is enough that one assumes that this is the case—for the sake of convenience. Whether this is in fact the case or not is an additional issue, quite independent of the various fundamental roles identity has. For these roles can be played in an ontologically minimal way, by simply pre-supposing that the objects under consideration have the identity conditions in question. The pre-supposition is enough to allow one to reason about the objects in question. Does the object also need to have the identity conditions imposed on them? I don’t think the issue needs to be settled. The situation here is analogous to the use of an idealized model in science. We know that objects near the surface of the earth are subject to air resistance and a number of other factors that influence their motion. However, if we were to take into account all these factors, very quickly our model that describes the relevant motions would be computationally intractable. So we idealize: we suppose that no such factors are operating. What we get is a rough estimate of the motions in question, but which is good enough to account for the main parameters under consideration.

Similarly, the pre-supposition that the objects in question have identity is a useful idealization, which simplifies enormously our conceptual framework and allows us to make reasonable predictions about the behavior of these objects, independently of whether the objects in question do exhibit the relevant identity conditions. This allows one to adopt a fairly empiricist stance toward identity, without having to take identity in any metaphysically substantive way.

Of course, metaphysicians can always go beyond these constraints and insist that identity’s fundamentality reflects a substantive feature of the world and that our metaphysics should reflect that. My point is just to suggest that this path is not forced upon us.

University of Miami

NOTES

My thanks go to Newton da Costa, Steven French, and Décio Krause for extremely helpful discussions and correspondence.

1. There are formal frameworks capable of characterizing this understanding of possible world: object theory provides a systematic and principled way of doing that. Details about object theory and discussion
of worlds can be found, for example, in Zalta (1983), and Bueno, Menzel, and Zalta (forthcoming). A
nominalist interpretation of object theory is developed in Bueno and Zalta (2005). Thus, the abstract
nature of the objects under consideration need not be a concern.

REFERENCES

Free,” Erkenntnis.
Domenech, Graciela, and Federico Holik. 2007. “A Discussion on Particle Number and Quantum
French, Steven, and Déco Krause. 2006. Identity in Physics: A Historical, Philosophical, and Formal
Krause, Décio, and Jonas Becker. 2006. “Hume, Schrödinger e a individuação de objetos físicos,”
Clarendon Press).
Clarendon Press).
11, no. 1, pp. 185–213.
Zalta, Edward. 1983. Abstract Objects: An Introduction to Axiomatic Metaphysics (Dordrecht, Nether-
lands: D. Reidel).