Identity and Ground

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We should not underestimate good identity criteria: With them, we can make progress in a variety of philosophical debates. Here are some examples of philosophical inquiries concerning identity criteria and their importance: in event metaphysics, we want to know what makes one event identical with or distinct from another. If we have a criterion for event identity, we can approach the question of whether mental events are identical with or distinct from physical events, knowing what types of features would render such events identical or distinct. When discussing personal identity, we want to know the conditions under which a person at one time is identical with or distinct from a person at a later or earlier time. If we have a diachronic identity criterion for persons, we can figure out whether you would survive a journey through a transporter machine that disassembles your atoms completely and then puts them back together again. Philosophers also search for a general synchronic identity criterion for objects: they look for what makes any objects x and y identical *at a time t.* If we had such an identity criterion, we could address an important question raised by Gottfried Leibniz, Max Black and others—that of whether distinct objects can share all of their qualitative features at a time.

This chapter concerns the nature of identity criteria and the relationship between ground and facts of identity or distinctness. After discussing some preliminaries in section I, we turn to formulations of identity criteria in terms of ground in section II. In sections III, we explore reasons for and

against taking (at least some) identity and distinctness facts to be fundamental. In section IV, we discuss specific proposals for grounding identity and distinctness facts.

I. Preliminaries

Identity facts are ones like World War I = World War I, and distinctness facts are ones like The Louvre ≠ The Prado. For our purposes, any fact involving the identity relation counts as an identity fact; although, most identity facts will take the form of 'x = y' (where x and y are objects). Every fact of the form '~ x = y' (often written as x ≠ y) counts as a distinctness fact for our purposes.

I will employ a fact-based account of ground as opposed to a sentential-operator account in what follows. Facts are worldly entities on this picture. They are complexes containing objects and properties/relations as constituents. On the fact-based account of ground, ground is taken to be a relation holding among facts. I will also assume the grounding relation is transitive, asymmetric and (hence) irreflexive and that ground is factive. These assumptions are not necessary in all of the remarks below, but they will streamline the discussion.

I primarily discuss two varieties of identity and distinctness facts.

1. *General (or Quantificational)* Identity and Distinctness facts: These involve quantification over entities which stand in the identity or distinctness relations. Examples include, (∀x)(x = x), (∃x)(x = Angela Merkel), and (∃x)(∃y)(x ≠ y).

   And

2. *Individual* Identity and distinctness facts: These concern the identity or distinctness of individual entities (they can be objects, properties, relations, etc.). Examples include, Angela Merkel = Angela Merkel, and Angela Merkel ≠ Emmanuel Macron.

II. Identity criteria and ground.

We often provide identity criteria in terms of necessary and sufficient conditions: x = y if and only if condition P obtains. For example, "person x = person y iff x is psychologically continuous with y" has this form. Following Kit Fine (2016), we call identity criteria of this form, "material criteria." [i] Fine (2016) formulates identity criteria in terms of ground as well: if x = y, then some fact P grounds x = y. For example, "if person x = person y, then x = y is grounded in the fact that x and y are psychologically continuous" has this structure. We call identity criteria of this form, "grounding criteria". Going forward, it will be helpful to contrast material and grounding criteria using a specific example. Let's consider a material criterion for set identity. For sets x and y:

Set-Identity$_{mat}$: $x = y$ iff $(\forall z)(z \in x \equiv z \in y)$

In other words, set x is identical with set y *if and only if* x and y have all and only the same members. We can also formulate a grounding criterion for set-identity:

Set-Identity$_{g}$: if $x = y$, then $x = y$ is fully grounded in the fact: $(\forall z)(z \in x \equiv z \in y)$.

Some philosophers, like Fine (2016), maintain that we should seek out grounding criteria if we want to pinpoint *in virtue of* what entities are identical or distinct. Since *in virtue of* is plausibly

an asymmetric notion, material criteria cannot tell us in virtue of what objects are identical or distinct. Material criteria do not establish any direction of dependence. Set-Identity$_{mat}$ merely tells us that if $(\forall z)(z \in x \equiv z \in y)$ obtains then $x = y$, and if $x = y$, then $(\forall z)(z \in x \equiv z \in y)$ obtains. Alternatively, since ground strives to capture a metaphysical notion of *in virtue of*, it is better suited for capturing a notion of asymmetric dependence. If ground is an asymmetric relation, Set-Identity$_{g}$ tells us that if $x = y$, $(\forall z)(z \in x \equiv z \in y)$ grounds $x = y$, in which case $x = y$ does not ground $(\forall z)(z \in x \equiv z \in y)$.

Given that the grounding theorist typically thinks that if P grounds Q then P metaphysically explains Q (see Glazier's contribution to this volume for discussion of the connection between ground and metaphysical explanation), grounding criteria will be attractive to those who want a metaphysical explanation of why entities are identical or distinct. We often look for a metaphysical explanation when we confront puzzling cases about identity. For instance, when we encounter the thought experiment in which Man A enters a transporter and two psychological and physical duplicates of him, Man B and Man C, emerge, we want to explain in virtue of what Man A is identical with or distinct from Man B. Well, to be fair, first we want to know *whether* Man A is identical with or distinct from Man B, and similarly for the relation between Man A and Man C. But to support that verdict, we want to know *why* Man A is identical with or distinct from Man B. We want a metaphysical explanation of this identity or distinctness fact. Thus, a grounding criterion of personal identity would be valuable for us, if we could find one.

Let's turn to the relationship between grounding criteria and material criteria: material criteria do not typically entail grounding criteria as we have seen above, but do grounding criteria entail material criteria? It depends on how we formulate grounding criteria. Set-Identity$_{g}$ will establish

that if x = y then (∀z)(z ∈ x ≡ z ∈ y), which is the necessity condition of Set-Identity$_{mat}$. Since Set-Identity$_{g}$ states that if x = y, then (∀z)(z ∈ x ≡ z ∈ y) grounds x = y, it follows that (∀z)(z ∈ x ≡ z ∈ y) must obtain if x = y does. What about sufficiency? If (∀z)(z ∈ x ≡ z ∈ y), then will x = y hold? Set-Identity$_{g}$ does not yield this result automatically. The criterion does not rule out that (∀z)(z ∈ x ≡ z ∈ y) obtains yet x is distinct from y. Set-Identity$_{g}$ says only that *if* x = y, then (∀z)(z ∈ x ≡ z ∈ y) grounds x = y. And while we antecedently do believe it is metaphysically impossible for distinct sets to share all their members, the formulation of Set-Identity$_{g}$ itself does not rule this possibility out.

However, we can construct a grounding criterion for identity and distinctness that would explicitly entail the sufficiency condition of the material criterion. For sets x and y:

Set-Identity$_{g2}$:

(1) If x = y, then x = y is fully grounded in the fact (∀z)(z ∈ x ≡ z ∈ y).

And

(2) If x ≠ y, then x ≠ y is fully grounded in the fact ~(∀z)(z ∈ x ≡ z ∈ y).

Here, if x ≠ y, then x ≠ y is fully grounded in ~ (∀z)(z ∈ x ≡ z ∈ y). So ~ (∀z)(z ∈ x ≡ z ∈ y) obtains if x ≠ y does. By contraposition and double negation elimination, if (∀z)(z ∈ x ≡ z ∈ y) then x = y. The sufficiency condition of Set-Identity$_{mat}$ is thereby established.

We have now examined differences between grounding criteria and material criteria. Grounding criteria capture a direction of dependence, they back metaphysical explanations, and certain

formulations of grounding criteria are strong enough to entail corresponding material criteria. If we want our identity criteria to back metaphysical explanations while generating both necessary and sufficient conditions for the identity of the entities in question, formulations of identity criteria with the form of Set-Identity$_{g2}$ will be preferable over formulations like Set-Identity$_{g}$ and Set-Identity$_{mat.}$

When formulating grounding identity criteria, there is a question of which types of identity and distinctness facts are involved. To clarify, Fine (2016) discusses two options. First, identity criteria may tell us, for *any* objects x and y, in virtue of what they are identical. Fine calls this a "general" criterion and describes it thusly: "[the general criterion] tells us, for any two particular objects of the sort in question, what makes them the same" (Fine, 2016, p.4). We can clarify the form of general criteria using universal quantifiers as follows:

Set-Identity$_{g\text{-}general}$: $(\forall x)(\forall y)[Set(x) \& Set(y) \& x = y \supset (x = y$ is fully grounded in $(\forall z)(z \in x \equiv z \in y))]$

Another alternative is to formulate identity criteria in terms of arbitrary objects. Following Fine, we can call a grounding criterion involving arbitrary objects, a "generic" criterion. Instead of stating that for any sets x and y, if x = y then x = y is grounded in $(\forall z)(z \in x \equiv z \in y)$, we claim that for the *arbitrary sets x and y*, if x = y then that fact is grounded in $(\forall z)(z \in x \equiv z \in y)$. The generic criterion for sets would then pose an answer to the question: "in virtue of what are these two sets the same, i.e., what is it about the two arbitrary sets (considered as representative individual sets, not as objects in their own right) that would make them the same?" (Fine 2016:13)

Set-Identity$_{\text{g-generic}}$: For arbitrary sets x and y, if x = y then then x = y is fully grounded in the fact: $(\forall z)(z \in x \equiv z \in y)$.

As a presentational note: In the previous sections, I left it ambiguous whether Set-Identity$_{g}$ Set-Identity$_{g2,}$ and Set-Identity$_{n\&s}$ should be understood generally or rather generically (as invoking arbitrary objects). I will do the same in section V. I will leave it up to the reader whether we should best interpret the proposed identity criteria in that section generally or generically.

Fine favors generic criteria over general criteria. General criteria demonstrate how to ground individual identity and distinctness facts, the instances of the universal generalization. But Fine thinks the question of what grounds the fact that individual sets are identical with themselves is just a "pseudo-problem—one that we cannot take seriously as answering to any real issue about the identity of sets." (Fine 2016, p.12) When we provide a metaphysical explanation of set-identity, we do not care about explaining in virtue of what is it the case that{Socrates} is identical with {Socrates}. We do not care about {Socrates} in particular. Instead, we want a generic criterion that will tell us in virtue of what any two arbitrary sets are identical.

One's preference for general criteria over generic criteria (or *vice versa*) will partially turn on whether one is seeking grounds for individual identity and distinctness facts. Someone who rejects grounding individual identity and distinctness facts may instead be inclined towards generic identity criteria. One's preference will also turn on whether they admit arbitrary objects in their ontology. If not, then one may be more inclined towards general criteria. For further discussion of generic identity criteria and its appeal, see Fine (2016), and for further discussion of arbitrary objects, see Fine (1985)

III. When (if ever) are identity or distinctness facts fundamental?

Is it truly just a pseudo-problem to consider in virtue of what is it the case that {Socrates} is identical with itself? If such facts do not hold in virtue of other facts, are we pressured to take them to be fundamental? In this section, we turn our attention to identity and distinctness facts that do not involve arbitrary objects. We will examine three sources of motivation for taking at least some identity and distinctness facts to be fundamental.

One may take objects being identical or distinct from one another to serve as a "precondition" of their standing in other kinds of relations to one another. The distinctness of The Louvre and The Prado, for example, serves as a precondition for their being spatially separated from one another. Fiocco (forthcoming) articulates an idea in this vicinity; he maintains that the "individuation of a thing is inexplicable" (although it is not clear that Fiocco himself would conclude from this that identity and distinctness facts are metaphysically fundamental).

We need to better understand what it is for one fact to be a "precondition" of another and whether this pressures us to take identity and distinctness facts to be metaphysically ungrounded. One option is to characterize preconditions modally: a fact Φ is a precondition of another fact Ψ when Φ is a necessary condition of Ψ. On this characterization, Φ may still be metaphysically grounded—and even metaphysically grounded in Ψ. On this characterization, the conjunctive fact, $2 + 2 = 4 \ \& \ 3 + 3 = 6$, is a modal precondition of $2 + 2 = 4$. It is necessary that the former obtains in order for the latter to obtain. Nevertheless, $2 + 2 = 4$ grounds the conjunctive fact. Thus, it

cannot be identity and distinctness facts serving as modal preconditions for other facts which establishes that identity and distinctness facts are metaphysically fundamental.

Perhaps there is another notion of a precondition in play, i.e., that identity and distinctness facts serve as "grounding preconditions" for other facts—where a fact Φ is a grounding precondition of fact Ψ when Φ partially grounds Ψ. Perhaps the fact that objects x and y are distinct serves as a grounding precondition for x and y's standing in other relations. For example, perhaps the fact that a is distinct from b is a grounding precondition of the fact that a is more massive than b. And similarly, identity facts are grounding preconditions for objects standing in other relations to themselves. For instance, the fact that a = a is a grounding precondition for the fact that a is as massive as a; a = a partially grounds the fact that a is as massive as a. Yet, even if identity and distinctness facts are grounding preconditions for objects standing in polyadic relations to objects, this would not establish that identity and distinctness facts are ungrounded. Perhaps they are grounded in objects' instantiating certain monadic properties.

In response, we can broaden the proposal: maybe identity and distinctness facts are grounding preconditions for objects instantiating any properties/standing in any relations whatsoever (other than the identity and distinctness relations themselves). If you think that identity and distinctness facts are grounding preconditions in this broader sense, this lends plausibility to the claim that they are ungrounded: we are running out of facts to potentially ground them!

However, it is not clear that identity and distinctness facts are grounding preconditions in this sense. It seems like many facts we would intuitively count as metaphysically fundamental no longer count as such if they have identity/distinctness facts as grounding preconditions. If e = e

(where e is an electron) is a grounding precondition of e's having -1 charge, then we cannot claim that the fact that e has -1 charge is fundamental (ungrounded). It is also not clear what the full grounds of e has -1 charge would be if e = e serves as a partial (but not full) ground of that fact. Similar issues arise for every fact involving objects instantiating intuitively fundamental physical properties/standing in fundamental physical relations. Thus, taking identity and distinctness facts to serve as grounding preconditions for other facts raises a number of interesting questions about how to pinpoint fundamental facts and how to understand partial ground.

A second source of motivation for taking certain identity and distinctness facts to be fundamental may arise if you think that identity is "joint-carving." Theodore Sider (2011) takes certain quantificational identity and distinctness facts or truths to be fundamental; although, he does not understand fundamentality in terms of ground (See Tahko's "Structure" in this volume for more on Sider's notion of fundamentality and joint-carvingness). Sider treats the following notions as joint-carving: "first-order quantification theory (with identity), plus a predicate symbol $\in$ for set-membership, plus predicates adequate for fundamental physics, plus the notion of structure." (2011: 292-3) Sider characterizes facts as fundamental when they involve purely joint-carving notions. Fundamental facts will include ones like $(\exists x)Rx$, $(\exists x)(Rx \vee Lx)$, etc. where R and L are joint-carving predicates, and $\exists$ is a joint-carving existential quantifier. Since the identity predicate appears to be joint-carving, identity and distinctness facts like $(\exists x)(\exists y)(x = y)$, $(\exists x)(\exists y)(x \neq y)$ and $(\exists x)(\exists y)((Px \ \& \ Qy) \ \& \ (x \neq y))$ will count as fundamental if P and Q are joint-carving predicates and $\exists$is a joint-carving existential quantifier.

Does the grounding theorist also have this basis for treating certain identity facts as fundamental? Grounding theorists typically ground logically complex facts in their simpler components. For

example, grounding theorists do not commonly take disjunctions, conjunctions, or existential generalizations to be fundamental. Conjunctions and disjunctions are grounded in their conjuncts and disjuncts, respectively. Existential generalizations are commonly grounded in their instances (see McSweeney's entry "Grounding Logically Complex Facts" and Poggiolessi's entry "Logics of Ground" in this volume for further discussion of these topics). Thus, it does not seem as though Sider's rationale for treating certain identity and distinctness facts as fundamental carries over into a grounding context. The identity and distinctness facts Sider treats as fundamental, such as $(\exists x)(\exists y)(x \neq y)$ and $(\exists x)(\exists y)(x = y)$, will be non-fundamental for the grounding theorist who claims these facts are grounded in their instances, $a \neq b$ and $a = a$, respectively.

Of course, the grounding theorist can reject that quantificational facts are grounded in their instances, in which case she may be more sympathetic to Sider's view.[ii] But if the grounding theorist is not willing to go this route, the question will become: do we have good reasons to treat individual identity and distinctness facts, like $a \neq b$ and $a = a$—the ones which ground $(\exists x)(\exists y)(x \neq y)$ and $(\exists x)(\exists y)(x = y)$—as fundamental? How can we ground these facts? We will discuss proposals for grounding individual identity and distinctness facts in section VII.

Finally, a third reason to posit fundamental identity and distinctness facts is to account for certain kinds of metaphysical possibilities. For example, we will consider a scenario popularized by Max Black (1952), the "sphere world." The sphere world contains two qualitatively identical spheres, Castor and Pollux, in an otherwise empty universe. It is difficult to determine on what basis Castor and Pollux are distinct. They are both silver, they both have a mass of 5kg, they are both 10 meters from one another, and so on.

If we take certain identity and distinctness facts to be fundamental, we can sidestep the question of what makes Castor distinct from Pollux. They just *are* distinct; it is a brute fact. We can posit a fundamental distinctness fact in the sphere world to accommodate this. Shamik Dasgupta (2009) recommends this approach. The fundamental distinctness fact in the sphere world could take the following form:

$(\exists x)\ (\exists y)((Px\ \&\ Py)\ \&\ x \neq y)$

where P is a predicate that picks out the full qualitative profile of each of the spheres. The fan of individual identity and distinctness facts could also adapt his proposal and posit fundamental distinctness facts of the form: Castor ≠ Pollux or (P(Castor) & P(Pollux)) & Castor ≠ Pollux instead.

The attractiveness of taking facts like $(\exists x)\ (\exists y)((Px\ \&\ Py)\ \&\ x \neq y)$ or Castor ≠ Pollux to be fundamental hinges on the idea that we have no basis upon which to distinguish the spheres in Max Black's famous scenario. It also hinges upon the idea that we do not always need grounding criteria of identity: We do not need grounding criteria for the identity of material objects like spheres on this proposal. In the next section, we consider opposing proposals. We will investigate proposals which attempt to provide grounding criteria for the distinctness of Castor and Pollux.

IV. Proposals for grounding identity and distinctness facts.

We have looked at three sources of motivation for treating some identity and distinctness as fundamental as well as issues potentially undermining these motivations. Now we will consider

four options for taking identity and distinctness facts to be grounded. Burgess (2012), Donaldson (2015), and Fine (2012) all discuss proposals for grounding individual identity facts involving objects. I focus on grounding facts involving object identity and distinctness as this has been the most discussed in the literature. It is a substantive question which (if any) of these grounding proposals could be extended to accommodate the identity of entities in other ontological categories (such as properties, relations, facts, etc.).

One way to ground identity and distinctness facts is by appealing to the properties objects share. More specifically, we can appeal to one half of Leibniz's Law, the Principle of the Identity of Indiscernibles, in order to offer a metaphysical explanation of identity and distinctness facts (see Della Rocca (2005)). While this proposal has trouble accommodating the sphere world from the previous section, it will be worthwhile to examine the proposal more closely to see why it is problematic.

The Properties Proposal:

(1) If $x = y$, then $x = y$ is fully grounded in the fact that $(\forall P)(Px \equiv Py)$. And,

If $x \neq y$, $x \neq y$ is fully grounded in the fact $(\exists P)(Px \,\&\, \sim Py) \vee (\exists P)(\sim Px \,\&\, Py)$

$\forall P$ ranges over properties. We should restrict the class of properties to qualitative ones—properties that do not involve the identities of individual objects. If we invoke facts involving non-qualitative properties (properties like *is identical with b* or *is distinct from a*) to ground individual identity and distinctness facts, we could ground the fact that $a \neq b$ in the fact that b has the monadic property *is identical with b* while a does not have that property. This would render the account trivial. We

will also violate irreflexivity if the fact that b has the monadic property *is identical with b* is grounded in b's standing in the binary identity relation to b.

While we can just restrict the class of properties to "qualitative" ones that do not involve the identities of particular objects, this results in a big problem for the proposal: It will not accommodate the metaphysical possibility of distinct yet qualitatively identical objects in an otherwise empty world, i.e., the sphere world discussed in the previous section. We lack the grounds for the distinctness of the two qualitatively identical spheres. In fact, since (∀P)(P(Castor) ≡ P(Pollux)) obtains, the grounds for Castor = Pollux obtains. If the grounds necessitate what they ground, this should establish that Castor = Pollux, which conflicts with the set-up of the scenario.

The second proposal appeals to facts about the existence of objects in order to ground identity and distinctness facts. Burgess (2012: 90) suggests that identity facts at first "seem to be nothing over and above the relevant existential facts." Epstein (2015:169-181) expresses sympathy for this proposal. Perhaps we can ground identity and distinctness facts in the existence of objects.

The Existence Proposal:

(1) If x = y, then x = y is fully grounded in the fact x exists.

And

(2) If x ≠ y, x ≠ y is fully grounded in the plurality of facts: x exists, y exists.

One advantage of the Existence Proposal over the Properties Proposal is that it accounts for the distinctness of the Max Black spheres. In the possible world where only Castor and Pollux exist,

Castor ≠ Pollux is grounded in the two facts: Castor exists, Pollux exists. Castor = Castor is grounded in the single fact, Castor exists.

Burgess (2012) explores a version of The Existence Proposal and points out a troubling feature. If the fact that Castor exists has the logical form (∃x)(x = Castor) then Castor = Castor is fully grounded in the fact that (∃x)(x = Castor). And if existentially quantified facts are grounded in their instances, (∃x)(x = Castor) is grounded in Castor = Castor, yielding a violation of irreflexivity.

The proponent of the Existence Proposal can avoid this result in a few different ways: 1. They can deny the transitivity or irreflexivity of ground (See Thompson's "Partial Order" for discussion), 2. They can deny that existential generalizations are grounded in their instances (see essays in this volume by McSweeney, Poggiolessi, and Krämer for discussion of options in line with 2), or 3. They can deny that existence facts are always existential generalizations. I will set options 1 and 2 aside and explore option 3. Instead of treating existence quantificationally, we can understand existence as a monadic property of objects. In this case, Castor exists will have the form of an atomic fact, E(Castor). As we have no reason to think E(Castor) will be grounded in the fact that Castor = Castor, we can avoid a potential violation of circularity by claiming that identity facts like Castor = Castor are grounded in facts like E(Castor).

The advocate of this alternative should say more about the grounds of facts like E(Castor). After all, if E(Castor) is at least partially grounded in (∃x)(x = Castor) we will face the same circularity. If E(Castor) is not grounded in this way, we should explain how existential-property facts and existential generalizations relate to one another (see Fine (2012) for discussion).

The Existence Proposal faces another issue: it cannot accommodate identity and distinctness facts (if there are any) involving non-existent entities. You may think that Santa Claus is identical with Santa Claus even though Santa Claus does not exist. If left unrestricted, the Existence Proposal predicts that if 'Santa Claus = Santa Claus' picks out a genuine identity fact, the ground of Santa Claus = Santa Claus is the existence of Santa Claus. This is problematic. Thus, the proponent of the Existence Proposal should presumably deny that there are identity facts involving non-existent objects. (The plausibility of this may depend upon whether one has a fact-based or sentential operator-based account of ground. We can deny that Santa Claus = Santa Claus picks out a genuine identity fact on a fact-based account of ground, especially if we take facts of the form a = b to involve objects instantiating properties/relations. We would presumably deny that Santa Claus = Santa Claus picks out a genuine fact on this view because there is no object to stand in the identity relation. However, if we have a sentential-operator account of ground, we may want to uphold 'Santa Claus = Santa Claus' is a true sentence (even if it does not correspond to a worldly fact). Thus, it is not clear what a proponent of the Existence Proposal who subscribes to the sentential-operator approach should say about the grounds of 'Santa Claus = Santa Claus'.).

A third alternative is to ground identity and distinctness facts in facts concerning parthood (see Burgess 2012[iii]). Perhaps x is identical with y when x is part of y and y is part of x. This approach requires us to take the notion of part to be more fundamental than that of identity. Here is one way to formulate the parthood proposal, where the predicate O picks out the relation *is part of*.

The Parthood Proposal:

(1) If x = y, x = y is fully grounded in the plurality of facts: Oxy, Oyx.

And

(2) If x ≠ y then x ≠ y is fully grounded in the fact ~ Oxy, or x ≠ y is grounded in the fact ~Oyx.

When x is part of y and y is part of x, then x is what is often called an "improper part" of y. One common way to understand the *improper parthood* relation is in terms of identity: x is an improper part of y iff x is identical to y. We contrast the *improper parthood* relation with the more intuitive *proper parthood* relation, where x stands in the proper parthood relation to z when x is part of z and x is not identical to z. To avoid circularity, it is important that we do not define O in terms of improper parthood, and then define improper parthood in terms of identity. For example, we cannot think of O as picking out the disjunctive relation, *is either a proper part of or an improper part of* relation and then define *improper parthood* in terms of *being identical with*. Instead, the proponent of the Parthood Proposal would more likely leave the *is part of* relation undefined or primitive.[iv]

This proposal can distinguish everyday objects we encounter: the Coca Cola bottle is distinct from the cheeseburger because neither is part of the other. They do not even share any parts in common. And the fact that the cheeseburger is an improper part of itself will ground the fact the cheeseburger is identical with itself. While the bottle and the cheeseburger are intuitively mereological fusions made up of proper parts, the Parthood Proposal is supposed to work for mereological atoms as well. While mereological atoms have no proper parts, they have themselves as improper parts.

This proposal can also distinguish Castor and Pollux in the sphere world: Castor is not part of Pollux nor is Pollux part of Castor. So both disjuncts are satisfied in the grounds of Castor ≠ Pollux.

Nevertheless, the parthood proposal is definitely not for everyone. Ted Sider resists defining identity in terms of parthood. While he does not discuss ground, his concerns may carry over into a discussion of grounding criteria. Sider states:

> "[C]onsider the objection that adopting parthood in fundamental theories allows the elimination of identity from ideology via the definition "$x = y =_{df} x$ is part of y and y is part of x". The savings in ideological parsimony would be outweighed by increased complexity in the laws, which I take to include laws of logic and metaphysics. The logical laws governing '=' must now be rewritten in terms of the proposed definition, making them more complex; and further, the laws of mereology will be needed." (Sider 2013: fn. 10)

Sider thinks if we understand identity in terms of parthood, we will have to rewrite the logical laws in terms of mereological notions, and this revision will be much more complex than the versions we have involving identity. This added complexity is problematic if we favor simpler theories.

The Parthood Proposal will also face resistance from some (but not all) mereological nihilists. The mereological nihilist denies that objects have proper parts. Under one version of mereological nihilism, only mereological atoms exist, and they are improper parts of themselves. This view appears to be compatible with the Parthood Proposal: every atom is an improper part of itself and not a part of any distinct atoms. Other versions of mereological nihilism cannot accept the Parthood Proposal. Consider a version of mereological nihilism which denies the existence of

parthood relations from the outset. This mereological nihilist will also claim that the only objects that exist, fundamentally speaking, are mereological atoms; yet, they will deny that the atoms are parts of themselves because they deny that anything stands in the parthood relation. The proponent of this version of mereological nihilism cannot use The Parthood Proposal to generate the correct verdicts about identity and distinctness. Finally, the Parthood Proposal may be too limited in scope if we are seeking a general account of object-identity. Insofar as there are objects that do not stand in any parthood relations—such as abstract objects, like numbers—the Parthood Proposal cannot ground identity and distinctness facts concerning them.[v]

The fourth and final proposal we will consider is whether identity and distinctness facts are zero-grounded. A fact is zero-grounded when it is not grounded in further facts, but it is not ungrounded either. Fine describes the distinction between being ungrounded and being zero-grounded:

> "There is a...distinction to be drawn between being zero-grounded and ungrounded. In the one case, the truth in question simply disappears from the world, so to speak. What generates it... is its zero-ground. But in the case of an ungrounded truth...the truth is not even generated." (Fine (2012: 48))

Fine then considers taking identity facts to be zero-grounded:

> "But in other cases—as with Socrates being identical to Socrates or with Socrates belonging to singleton Socrates—it is not so clear what the contingent truths might be; and a plausible alternative is to suppose that they are somehow grounded in nothing at all." (Fine (2012: 48))

Tom Donaldson (2017) explores taking certain mathematical identity facts to be zero-grounded as well. We can formulate a version of the Zero-Ground Proposal as follows:

The Zero-Ground Proposal$_1$:

(1) If x = y, then x = y is zero-grounded.

Identity facts are grounded on this proposal even though there are no facts which ground them. The distinction between being ungrounded and being zero-grounded is significant because, were we to take identity facts to be ungrounded, we would be pressured to treat them as fundamental. Since the Zero-Ground Proposal$_1$ maintains that identity facts are grounded, they are presumably non-fundamental.

While Fine and Donaldson are primarily concerned with identity facts, we could extend the Zero-Ground Proposal$_1$ to accommodate distinctness facts (Although it is not clear that the reasons for treating identity facts as zero-grounded apply to distinctness facts as well).

The Zero-Ground Proposal$_2$:

(1) If x = y, then x = y is zero-grounded.

(2) If x ≠ y, then x ≠ y is zero-grounded.

With the added clause for distinctness, the Zero-Ground Proposal$_2$ can accommodate the sphere world. Castor ≠ Pollux is zero-grounded. Unlike the other proposals, the Zero-Ground Proposal$_2$

maintains that identity facts and distinctness facts have the same grounds. Castor = Castor and Pollux = Pollux are also zero-grounded. This is not necessarily problematic, but it is not yet clear that this proposal yields a satisfactory metaphysical explanation of why objects are distinct. If we are looking for a basis upon which to distinguish objects like Castor and Pollux, then I am not sure the Zero-Grounding Proposal$_2$ provides it. The distinctness of Castor and Pollux is metaphysically explained on the Zero-Grounding Proposal$_2$—but not on the basis of any facts.

This proposal maintains that distinctness facts are grounded in the same way identity facts are grounded: they have the null ground. Perhaps different kinds of facts should admit of different grounds. For example, Dasgupta (2014) objects to grounding facts in their grounds because it would render "P grounds P ν P" as grounded in the same way as "P grounds P & P". (Both would be grounded in P). He thinks there should be a difference in the grounds of "P grounds P ν P" and "P grounds P & P": the former fact concerns disjunction whereas the latter concerns conjunction. The grounds should reflect this difference, so the thought goes. Likewise, we may object to the Zero-Ground Proposal$_2$ because it is implausible that identity and distinctness facts would have exactly the same grounds. It is strange for facts of the form x = y and of the form ~ x = y to have exactly the same grounds.

All of these proposals for grounding identity and distinctness facts have issues in need of further examination. There is a lot of philosophical room left to explore when questioning whether and how to ground identity and distinctness facts. The aim in this chapter is not to advocate formulating identity criteria in terms of ground, nor is it to convince the reader that some identity and distinctness facts must be grounded. Instead, I hope to have provided a panoply of options open for investigation and that the reader has gained a sense of which avenues she can pursue.

[i] We also often witness a modal analog of material criteria: □[x = y if and only if condition P obtains]. We will only discuss non-modal material criteria in what follows.

[ii] See Rosen (2010) for discussion of reasons to take certain universal generalizations as fundamental.

[iii] See Smid (2017) as well; although, he is not concerned with ground in his paper.

[iv] We should note that if one accepts extensional mereology with a strong supplementation principle, then we will not have distinct objects with the same parts on this view.

[v] However, some philosophers argue that entities other than concrete objects stand in parthood relations. See Paul (2002) and Fine (2010)

Cross-References

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Recommended Papers/Books

French, Steven. (1989) "Identity and Individuality in Classical and Quantum Physics." *Australasian Journal of Philosophy* 67.4 432 – 46. (This contains further discussion the identity of indiscernibles in the context of contemporary physics)

Hawley, Katherine. (2009) "Identity and Indiscernibility." *Mind* 118.469 101 - 19. (This contains further discussion the identity of indiscernibles in the context of contemporary physics and metaphysics)

Lowe, E.J. (1998) *The Possibility of Metaphysics: Substance, Identity, and Time*. Clarendon Press: Oxford. (This book contains helpful discussion of identity criteria in metaphysics)

Quine, W. V. "Grades of Discriminability." *Journal of Philosophy* 73.5 (1976): 113-16. (This article contains discussion of different kinds of distinguishibility)

Williamson, Timothy. (1990) *Identity and Discrimination*. Wiley Blackwell: Oxford. (This book discusses the relationship between identity, understood as a metaphysical notion, and discrimination, understood as an epistemological notion).

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