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Unified Foundations for Essence and Ground

ABSTRACT: *I argue in favor of a distinctive generic form of essence and ground and show how the two notions thereby complement one another as forms of necessary and sufficient condition.*

KEYWORDS: metaphysics, metametaphysics, philosophical logic, essence, ground, generic

There are, I believe, two different kinds of explanation or determination to be found in metaphysics—one of *identity*, or of *what* something is, and the other of *truth*, or of *why* something is so. One may explain *what* singleton Socrates is, for example, by saying that it is the set whose sole member is Socrates and one may explain *why*, or that in virtue of which, singleton Socrates exists by appeal to the existence of Socrates. One might talk in connection with the first of *essence*, of what singleton Socrates essentially is, and in connection with the second one might talk of *ground*, of what grounds the existence of singleton Socrates.[1]

Of course, explanations of identity and of truth also occur outside of metaphysics, but what is characteristic of their occurrence within metaphysics is the especially tight connection between explanandum and explanans. Being a set whose sole member is Socrates is somehow *constitutive* of what Socrates is, and Socrates's existing is somehow *constitutive* of the existence of singleton Socrates. It is perhaps hard to say in general what constitutes a constitutive explanation, but it is at least required, in any case of a constitutive explanation, that there should be metaphysically necessary connection between explanandum and explanans. Given that singleton Socrates is essentially a set whose sole member is Socrates, then it is metaphysically necessary that the set is one whose sole member is Socrates, and given that Socrates existence grounds the existence of singleton Socrates, it will be metaphysically necessary if Socrates exists that his singleton exists.

Given that there are these two kinds of explanation, the question naturally arises as to how they are related. There are some obvious parallels. After all, since each

I should like to thank the members of audiences at Birmingham, Oxford, and Oslo for many helpful comments.

1 The present paper is a companion to my paper 'Identity Criteria and Ground' and the reader may find it helpful, if not essential, to have the other paper at hand. I should note that Correia (2014) attempts to provide unified foundations, of a very different sort, in terms of an underlying notion of factual identity. There has been a growing literature on essence and ground in the recent philosophical literature. My own work on essence dates back to Fine (1994), and a useful reference on ground is the anthology of Correia and Schneider (2012).

is a form of explanation, each must conform to a noncircularity condition and not yield an explanation of something in terms of the very thing to be explained. Thus, we cannot explain what singleton Socrates is in terms of singleton Socrates, and if we provide an explanation of singleton Socrates in terms of Socrates, let us say, then we cannot go on to provide an explanation of Socrates in terms of singleton Socrates. Likewise, we cannot provide an explanation of why singleton Socrates exists in terms of the existence of singleton Socrates, and if we provide an explanation of why singleton Socrates exists in terms of the existence of Socrates, then we cannot go on to provide an explanation of why Socrates exists in terms of the existence of singleton Socrates.

There are also some plausible connections between the two kinds of explanation. Thus one might well think that if the existence of singleton Socrates is to be explained in terms of the existence of Socrates, then this explanatory link must itself somehow arise from the identity of singleton Socrates; it should somehow be part of the nature of singleton Socrates that its existence is to be determined in this way from the existence of Socrates. But how extensive are the parallels and how deep the connections?

I must confess that, on this point, my own work has not been altogether perspicuous. One major part of the problem is that I took the explananda in the two cases to be different in kind. In the one case, what was to be explained was the identity of an *object*, something that might be represented by a singular term. In the other case, what was to be explained was the truth of a *proposition*, something that might be represented by a sentence. Given this difference in the explananda, it was impossible to conceive of the connection between the explananda and the explanantia in a comparable way or directly to relate one kind of explanation to the other.

My present view is that the relationship between the two kinds of explanation is much closer than I had originally taken it to be. The decisive step toward achieving the desired rapprochement is to see both kinds of explanation as having a generic, as well as a specific, bearing on the objects with which they deal; they must be allowed to have application to an arbitrary individual of a given kind and not just to specific individuals of that kind. Once this step is taken, the initial disparities between essence and ground disappear, and we are able to provide a unified and uniform account of the two notions. I had previously referred to essence and ground as the pillars upon which the edifice of metaphysics rests (Fine 2012: 80), but we can now see more clearly how the two notions complement one another in providing support for the very same structure.

1.

Let us begin by considering my earlier treatment of essence (Fine 1994, 1995a, 1995b, 2000). In formalizing essentialist claims, I adopted a modification of the standard way of formalizing modal claims. Instead of using $\Box A$ for ‘necessarily A’, where A is a sentence and $\Box$ a sentential operator, I used $\Box_t A$ for ‘it lies in the nature of t that A’, where A is a sentence, as before, t a singular term, and $\Box_t$ a

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sentential operator (formed, if you like, from the essentialist operator □ and the singular term t). The notation was extended to the case in which the nature of several objects might be under consideration by indexing the essentialist operator □ to a predicate term F rather than a singular term t. The predicate term would be true of a number of objects—say, $x_1, x_2, \ldots$—and $\Box_F A$ was then taken to be true if it lay in the nature of those objects—$x_1, x_2, \ldots$—that A.

The notation I adopted was motivated by a strategic (and perhaps, to some extent, by an innate) conservatism. I wished to depart as little as possible from the standard way of formalizing modal claims in the hope that the transition to the essentialist claims might appear as seamless and unproblematic as possible. There was also a conservative impulse behind the interpretation of the essentialist operator. For I took it to be 'consequentialist', that is, closed under an appropriate notion of logical consequence, in the hope that many of the standard principles of modal logic would thereby be preserved.

In his important paper, Correia (2006) argued that my notion of essence was deficient in a certain respect. For in considering the nature of knowledge, for example, we might distinguish between two different questions. We might, on the one hand, ask 'what is knowledge?' To this, the answer might be 'knowledge is (by its nature) a certain kind of mental state'. We might, on the other hand, ask 'what is it to know?' And to this the answer might be 'to know a proposition is essentially (at least in part) to believe it on the basis of its truth'. These are two different questions with two different answers. But it seems as if I am only capable of doing justice to the first question, which concerns the nature of a certain kind of entity, and not to the second, which concerns, not the nature of a certain kind of entity, but of a predicable, knowing that *p*. Nor does it help to substitute some other entity for knowledge. If, for example, I ask 'what is the concept of knowledge?', I can still correctly say that the concept of knowledge is (by its nature) a concept, even though this has no direct bearing on the question of what it is to know.

I was aware of this difficulty when I wrote my earlier papers on essence but thought that it could be dealt with by distinguishing between the objectual and predicational nature of a concept (or property or the like). Thus when I ask 'what is it to know?', I am still asking about the nature of the concept, but in a certain regard—not as a subject of predication but in its predicational role, under which one can talk of something falling under the concept but not of the concept itself being some way. Thus the predicational essence was taken to be that part of the objectual essence of the concept that concerned its predicational character.

This is highly artificial and probably not even adequate.[2] For consider the concept of being a concept. Then it lies in the nature of the concept *concept* that it is a concept and perhaps also that there is such a concept, and so it lies in the nature of the concept *concept* that something falls under it. But it does not presumably lie in the nature of what it is to be a concept that something is a concept. Thus even though something falling under the concept belongs to the predicational aspect of its objectual essence, it is not part of its predicational essence.

2 Correia (2006) raises other objections to the attempt to reduce predicational to objectual essence. He also considers the reduction of objectual to generic essence discussed below.

Once one admits the notion of predicational essence, the question arises of how statements of predicational essence are to be formalized. One might follow the modal model for objectual essence (this appears to be Correia's [2006] preferred option). Thus if we symbolize 's knows p' by '$K(s, p)$' (with K a predicate) and '*s* believes *p* on the basis of its truth' by $BT(s, p)$, then our previous claim about the nature of what it is to know might be expressed in the form:

$$\Box_K \forall s \forall p (K(s, p) \supset BT(s, p)) \quad (1)$$

(it lies in the nature of what it is to know a proposition that if someone knows a proposition then he believes it on the basis of its truth). More generally, a predicational claim of essence will take the form:

$$\Box_F \varphi, \quad (2)$$

for F a predicate and φ a sentence. Of course, '□' was also indexed by a predicate F under our previous notation for objectual essence, but the use of the predicate was there quite different. It was used to indicate the plurality of objects whose essence was in question, whereas here it is the predicable itself whose essence is in question.[3]

But there is another way to formalize the claim, which will be critical to our providing a unified account of essence and ground. For we might use an essentialist arrow '$\leftarrow$', where $\varphi \leftarrow \psi$ is used to indicate that φ is essential to ψ. Our claim about the nature of what it is to know might then be expressed in the form:

$$BT(s, p) \leftarrow_{s,p} K(s, p) \quad (3)$$

(it is essential to *s*'s knowing *p* that *s* believes *p* on the basis of the truth of *p*). More generally, a predicational statement of essence will take the form:

$$\varphi \leftarrow_{x,y,\ldots} \psi_1, \psi_2, \ldots \quad (4)$$

(it is essential to $x, y, \ldots$ satisfying $\psi_1, \psi_2, \ldots$ that φ be the case), where $x, y, \ldots$ are variables and $\varphi, \psi_1, \psi_2 \ldots$ are open sentences.[4]

This formulation provides a sententialist account of essence, one in which a statement of essence is taken to consist in a connection between two sentential forms of expression. We thereby achieve a certain homogeneity in explanandum and explanans, a homogeneity we lacked previously. And we also bring the formulation of essentialist claims closer in form to the formulation of ground-theoretic claims,

3 This makes for difficulties if we wish to formalize plural claims of predicational essence in analogy to the plural claims of objectual essence. This is an interesting question but not one we shall pursue.

4 Thus just as we allow multiple explanantia in the case of ground we also allow multiple explananda in the case of essence. There is a question as to how to translate between the two notations represented in (2) and (4) above. One problem is this. Suppose I wish to say that it lies in the nature of what it is to be divine that something is divine. This might be expressed using the previous notation by $\Box_D \exists x Dx$. But how is it to be expressed in the present notation? One might try $\exists x Dx \leftarrow_x Dx$. But this might be rejected on the grounds that the specification of the nature of what it is to be divine should not itself involve divinity. To solve this problem, one might make use of a quasi-identity operator ≡ on predicates and express the claim in the form $\exists x Fx \leftarrow_F F \equiv D$, using a second-order index F in place of the first-order index x. These, and other such questions, call for more careful consideration.

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which may also be taken to involve a connection between sentential forms of expression.

There are two features of the resulting sententialist formulation we should note right away. First, the explanandum, that whose nature is being accounted for, appears to the right of the arrow and the explanans, that which accounts for the nature of the explanandum, appears to the left of the arrow. Thus the explicit implicative arrow runs from right to left, while the implicit explanatory arrow runs in the opposite direction, from left to right. Second, it is clear that (2) is intended to express a complete thought and so the variables '*s*' and '*p*' must somehow be bound, though I have not made clear how they are to be bound. This is a difficult question that is best postponed until we are also able to consider the corresponding question for ground.

We now seem to have two kinds of essentialist claims on our hands—the previous objectual claims, symbolized by statements of the form $\Box_t\varphi$ and the present predicational claims, symbolized by statements of the form $\varphi \leftarrow_{x, y, \ldots} \psi$. But once given the notion of predicational essence, it is very natural to treat objectual essence as a special case of predicational essence, even if predicational essence cannot plausibly be treated as a special case of objectual essence. If I ask 'what is the null set?', for example, I am in effect asking what it is for an arbitrary object *x* to be the null set, and if I answer 'the null set is essentially a set with no members', then I am in effect saying that it is essential to *x*'s being the null-set that *x* be a set with no members— something that might be symbolized as:

$$\mathrm{Set}(x) \wedge \neg\exists y(y \in x) \leftarrow_x x = \varnothing; \tag{5}$$

and, generally, the previous objectual statement of essence $\Box_t\varphi(t)$—to the effect that t essentially φ's—might now be expressed in the form:

$$\varphi(\mathrm{x}) \leftarrow_x x = \mathrm{t}.^5 \tag{6}$$

Interestingly, this formulation forges an intimate connection between essence, or the metaphysical notion of identity, and the identity relation, or the logical notion of identity. For to specify the nature of an object t is to specify what is essential to an object's being *identical to* t. Thus the use of the term 'identity' in each context is not entirely unwarranted. The present formulation is also close to the traditional formulations of essence, under which the essential properties of an object are the properties the object is required to have *to be the object that it is*. We might say that the mistake behind the standard modal formulation of essentialist claims, as in:

$$\Box\forall x[x = \mathrm{t} \supset \varphi(x)], \tag{6'}$$

lies, not in its appeal to the identity relation, but in its interpreting the essentialist arrow '←' modally, so that $\psi \leftarrow_x \varphi$ is taken to mean the same as $\Box\forall x[\psi(x) \supset \varphi(x)]$.[6]

5 More generally, $\Box_{t1,t2,\ldots}\varphi(t_1, t_2, \ldots)$ (with all occurrences of the terms $t_1, t_2, \ldots$ in φ explicitly displayed) might be expressed as: $\varphi(x_1, x_2, \ldots) \leftarrow_{x1,x2,\ldots} x_1 = t_1, x_2 = t_2, \ldots$.

6 A further error, as we shall see, is the quantificational treatment of the subscripted variable *x*.

I have previously argued that predicational essence should not be treated as a form of objectual essence. But it might also be thought that objectual essence should not be treated as a form of predicational essence.[7] For just as the treatment of predicational essence as objectual adds something extraneous to the predicational essence, viz., the nature of the surrogate object, so the treatment of objectual essence as predicational adds something extraneous to the objectual essence, viz. the nature of the surrogate predicable. For our concern is with what is Socrates, let us say, not with what it is to be identical to Socrates, and in responding to this concern, we wish to say something directly about Socrates himself and not something about what it is to be identical to Socrates.

Indeed, it might be thought that the present proposal leads to erroneous results. For we do not want to say that it is essential to singleton Socrates, say, that it have the same members as singleton Socrates, since this would be an account of singleton Socrates in terms of itself, but we might still want to say that it is essential to an object x being identical to singleton Socrates that x should have the same members as singleton Socrates, where the focus, so to speak, is on the *identity* to singleton Socrates rather than on singleton Socrates itself.

In response to this objection, one might wish to restrict the kind of predicational essence that is relevant to the essence of the corresponding object, just as we had previously considered restricting the kind of objectual essence that was relevant to the corresponding predicational essence. In the present case, we should restrict the essence of what it is for x to be identical to the object c to those features that do not concern c. The above case would then be ruled out, since the essence concerns singleton Socrates although we are still free to say that it is essential to x being identical to singleton Socrates that x is a set whose sole member is Socrates, since the essence, in this case, does not concern singleton Socrates. Indeed, if we take $\Box_c\varphi(c)$ to mean 'c essentially φ's', where all reference in φ to the object denoted by c has been removed, then the corresponding predicational essence $\varphi(x) \leftarrow_x x = c$ is guaranteed to be of the desired form.

The analogous move in the reverse case did not work; it led—or, at least, was in danger of leading—to unwanted essences. But it is not clear to me that this is so here; for under the proposed interpretation of $\Box_c\varphi(c)$, there would appear to be an exact correspondence between the truth of $\Box_c\varphi(c)$ and the truth of its predicational counterpart $\varphi(x) \leftarrow_x x = c$. I should therefore like to suggest, if only tentatively, that we continue to treat objectual essence as a special case of predicational essence.

2.

Let us turn to ground. I have suggested (Fine 2001, 2012) that statements of ground be expressed in the form:

$$\varphi_1, \varphi_2, \ldots < \psi \qquad (7)$$

7 I should like to thank Shamik Dasgupta for pressing this objection on me.

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(it is the case that ψ in virtue of it being the case that $\varphi_1, \varphi_2, \ldots$). With a slight shift in notation, we might also express them in the form:

$$\varphi_1, \varphi_2, \ldots \rightarrow \psi, \tag{7'}$$

with an unreversed arrow, thereby bringing out the connection with the reversed essentialist arrow '←' of (2)′ and (3)′. Note that, as with the essentialist case, the explanantia (grounds) lie to the left of the arrow and the explanandum (what is grounded) lies to the right. However, in this case, the implicit explanatory arrow runs in the same direction as the explicit implicational arrow.

Given this parallel, one might suspect that just as there are generic statements of essence:

$$\varphi \leftarrow_{x,y,} \ldots \psi, \tag{4}$$

so are there generic statements of ground:

$$\varphi \rightarrow_{x,y,} \ldots \psi. \tag{4'}$$

Indeed, suitable candidates for such statements are not hard to find. For given a generic statement of essence, one can just reverse the arrow and thereby obtain a generic statement of ground (though not necessarily of the same truth-value). Thus, corresponding to:

$$\mathrm{BT}(s, p) \leftarrow_{s,p} \mathrm{K}(s, p) \tag{3}$$

above will be:

$$\mathrm{BT}(s, p) \rightarrow_{s,p} \mathrm{K}(s, p) \tag{3'}$$

(a subject s knows the proposition p in virtue of s believing p on the basis of p). Or, to take a case of objectual essence: just as one might think that it was essential to the null set ∅ that it be a set with no members—as in (5) above—so one might think that an arbitrary object was the null set in virtue of having no members:

$$\mathrm{Set}(x) \wedge \neg\exists y(y \in x) \rightarrow_x x = \varnothing \tag{5}$$

It is also plausible (as suggested in Fine 2014) that traditional statements of identity criteria be treated as generic statements of ground. Thus, to say that having the same members makes two sets the same is to say:

$$(\mathrm{SET})[\text{Given } x, y \text{ where } \mathrm{Set}(x) \wedge \mathrm{Set}(y) : \forall z(z \in x \equiv z \in y) \rightarrow_{x,y} x = y]$$

and to say that psychological continuity across time makes two persons the same is to say:

(PERSON) [Given t, u where Time(t) ∧ Time(u) ∧ $t \neq u$: [given P, Q where P is a person existing at t ∧ Q is a person existing at u: (P at t is continuous with Q at $u \rightarrow_{t,u,P,Q} P = Q$)]].

And, of course, in these cases there will also exist corresponding statements of essence:

$$(\mathrm{SET})'[\text{Given } x, y \text{ where } \mathrm{Set}(x) \wedge \mathrm{Set}(y) : \forall z(z \in x \equiv z \in y) \leftarrow_{x,y} x = y]$$

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(given two sets, it is essential to their being the same that they have the same members);

(PERSON)′ [Given t, u where Time(t) ∧ Time(u) ∧ $t \neq u$: [given P, Q where P is a person existing at t ∧ Q is a person existing at u: (P at t is continuous with Q at $u \leftarrow_{t,u,P,Q} P = Q$)]]

(given two persons existing at different times, it is essential to their being the same that they be psychologically continuous from one time to the other).

3.

We now come to a critical question. How are the generic claims—such as (3) and (4) or (3) and (4)′ or (SET) and (PERSON)—to be interpreted?

One obvious way to interpret them is as the corresponding universal claims. Thus (3) becomes:

$$\forall s \forall p[\mathrm{BT}(s, p) \leftarrow \mathrm{K}(s, p)] \tag{3*}$$

(for any subject s and proposition p, s believing p on the basis of p is essential to s knowing p), while (3)′ becomes:

$$\forall s \forall p[\mathrm{BT}(s, p) \rightarrow \mathrm{K}(s, p)] \tag{3\#}$$

(for any subject s and proposition p, s believing p on the basis of p is a ground for s knowing p). Similarly, (SET) above becomes:

$$(\mathrm{Set})\forall x \forall y(\mathrm{Set}(x) \wedge \mathrm{Set}(y) \supset z(z \in x \equiv z \in y) \rightarrow x = y))$$

(for any sets x and y, x and y having the same members makes x and y the same), while (PERSON) becomes:

(Person) $\forall t \forall u(\mathrm{Time}(t) \wedge \mathrm{Time}(u) \wedge t \neq u \supset (\forall P \forall Q(\mathrm{Person}(P) \wedge \mathrm{Person}(Q) \wedge P$ exists at $t \wedge Q$ exists at $u \supset (P$ at t is continuous with Q at $u \rightarrow P = Q)))$

(for any distinct times t and u and persons P and Q existing at t and u, P at t being continuous with Q at u makes it the case that $P = Q$). Thus, the truth of a generic statement of essence or ground is taken, in each of these cases, to turn on the truth of its individual instances.

I have argued against this interpretation in the case of ground Fine (2014); and I believe that similar arguments apply in the case of essence. Consider again our generic rendition of the claim that ∅ is essentially a set with no members:

$$\mathrm{Set}(x) \wedge \neg\exists y(y \notin x) \leftarrow_x x = \emptyset. \tag{5}$$

The present suggestion is that this should be understood as a universal claim:

$$\forall \mathrm{x}(\mathrm{Set}(x) \wedge \neg\exists y(y \notin x) \leftarrow x = \emptyset) \tag{5\#}$$

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(for any object x, it is essential to that object's being identical to $\varnothing$ that it should be a set with no members) or perhaps as the restricted universal claim:

$$\forall x(x = \emptyset \supset \text{Set}(x) \wedge \neg\exists y(y \notin x) \leftarrow x = \emptyset),$$

this being tantamount to:

$$\text{Set}(x) \wedge \neg\exists y(y \notin x) \leftarrow \emptyset = \emptyset). \qquad (5)^{\#\#}$$

We are thereby committed to saying that it is essential to $\varnothing$ being identical to $\varnothing$ that $\varnothing$ should be a set with no members and also essential to any other particular thing—such as singleton Socrates or even Socrates—being identical to $\varnothing$ that it should be a set with no members.

Now it seems to me, in the first place, that it is somewhat problematic whether we want to say that it is essential to $\varnothing$ (or to Socrates) being identical to $\varnothing$ that it be a set with no members. One might well have thought that nothing is required of $\varnothing$ for it to be identical to $\varnothing$ —it just is identical—and that nothing could sensibly be required of Socrates for it to be identical to $\varnothing$ —it just is not identical. However, even if one holds such a view, then this would still not seem to bar one from holding that $\varnothing$ is essentially a set with no members and hence, granted the generic rendition of this claim, that it is essential to an arbitrary object being identical to $\varnothing$ that it should be a set with no members.

If, on the other hand, one holds that it *is* essential to $\varnothing$ (or to Socrates) being identical to $\varnothing$ that it should be a set with no members, then this will presumably be because one thinks that this is what it takes for an arbitrary object to be identical to $\varnothing$. Thus, the truth of the individual claim concerning the essence of $\varnothing$ (or of Socrates) being identical to $\varnothing$ will be taken to turn on the generic essentialist claim, rather than the other way round; accordingly, one should not attempt to provide an account of the generic claim in terms of its individual instances.

A similar point holds in regard to the necessity direction of identity criteria. Thus (SET)′ above becomes:

$$\forall x\forall y(\text{Set}(x) \wedge \text{Set}(y) \supset \forall z(z \in x \equiv z \in y) \leftarrow x = y)$$

(given any *individual* sets, it is essential to their being the same that they have the same members). But we are thereby saddled with the conclusion that it is essential to $\varnothing$ (or to singleton Socrates) being identical to $\varnothing$ that it should have the same members as $\varnothing$. And, as before, we may either reject this conclusion (since nothing is required of $\varnothing$, or could be required of singleton Socrates, to make it the same as $\varnothing$) or take it to turn on the corresponding generic claim.

I think, in any case, that there are generic statements of essence we might want to accept without accepting all of their instances. To adapt an example used to make a similar point in connection with ground, consider a non-well-founded set theory in which there is a set whose sole member is itself.[8] Call it *ss* (short for

8 Readers more comfortable with theology than set theory might prefer the example of a divinity that is essentially the sole cause of itself.

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self-singleton). Then it is plausible that it be essential to self-singleton that it be the sole member of itself:

$$x \in x \leftarrow_x x = s, \text{ and}$$

$$(\forall z \in x)(z = x) \leftarrow_x x = ss.$$

Instantiating to *ss*, we obtain:

$$ss \in ss \leftarrow ss = ss,$$

$$(\forall z \in ss)(z = ss) \leftarrow ss = ss.$$

But it may well be thought to be essential to $ss \in ss$ and $(\forall z \in ss)(z = ss)$, taken together, that $ss = ss$:

$$ss = ss \leftarrow ss \in ss, (\forall z \in ss)(z = ss).$$

But then from the appropriate version of Transitivity (or rather, Cut), we obtain:

$$ss = ss \leftarrow ss = ss$$

in violation of noncircularity.

If generic statements of ground or essence are not to be understood as general claims then how are they to be understood? I have previously suggested that generic statements of ground be understood in terms of arbitrary objects (where the background theory of arbitrary objects might be drawn from Fine 1985). Thus, the sufficiency direction of the identity criterion for sets:

$$\forall z(z \in x \equiv z \in y) \rightarrow x = y$$

will concern the disposition of two *arbitrary sets* x and y and will state that they are the same in virtue of having the same members.

I should like to make a similar proposal regarding generic statements of essence. Indeed, once given a treatment of ground in terms of arbitrary objects, considerations of uniformity strongly suggest a corresponding treatment of essence. Thus, the necessity direction of the identity criterion for sets:

$$\text{Given } x, y \text{ where } \mathrm{Set}(x) \wedge \mathrm{Set}(y) : \forall z(z \in x \equiv z \in y) \leftarrow_{x,y} x = y$$

will now be taken to state, of two arbitrary sets x and y, that it is essential to their being the same that their members be the same. Likewise, the generic rendition:

$$\mathrm{Set}(x) \wedge \neg\exists y(y \notin x) \leftarrow_x x = \varnothing$$

of the claim that the null set is essentially a set with no members will be taken to say, of an arbitrary object x, that it is essential to its being identical to the null set that it be a set with no members.

Although the treatment of generic claims of essence in terms of arbitrary objects is very natural and very much in line with our intuitive thinking, I am not opposed to a more orthodox treatment in terms of the lambda calculus. Thus in place of:

$$\text{Given } x, y \text{ where } \mathrm{Set}(x) \wedge \mathrm{Set}(y) : \forall z(z \in x \equiv z \in y) \leftarrow_{x,y} x = y$$

we might have:

$$[\lambda xy.\text{Set}(x) \wedge \text{Set}(y) : \forall z(z \in x \equiv z \in y)] \leftarrow [\lambda xy.\text{Set}(x) \wedge \text{Set}(y) : x = y]$$

(the condition of two sets having the same members is essential to the condition of two sets being the same), and in place of:

$$\text{Set}(x) \wedge \neg\exists y(y \notin x) \leftarrow_x x = \emptyset$$

we might have:

$$[\lambda x : \text{Set}(x) \wedge \neg\exists y(y \notin x)] \leftarrow [\lambda x : x = \emptyset]$$

(the condition of being a set with no members is essential to the condition of being identical to the null set). But for the reasons already given, I doubt that we can dispense with a deep form of genericity and 'cash out' all generic statements of essence or ground in terms of their instances.

4.

We are now in a better position to appreciate how the notions of essence and ground are related. There is a clear parallel in our notation for the two notions:

$$\varphi \leftarrow \psi_1, \psi_2, \ldots$$

$$\varphi_1, \varphi_2, \ldots . \rightarrow \psi,$$

with an arrow → serving as a sentential connective in the one case, flanked by any number of (open or closed) sentences on the left and a sentence on the right; with a reverse arrow ← serving as a sentential connective in the other case, flanked by any number of sentences on the left and a single sentence on the right; and with the possibility, in each case, of a generic reading of the statements $\varphi_1, \varphi_2, \ldots, \psi$.

But behind the notational parallel lies a deeper conceptual parallel. For in the case of essence, the statement on the left serves as a necessary condition for the statements on the right while, in the case of ground, the statements on the left serve as a sufficient condition for the statement on the right. In each case, the condition is a constitutive condition—either constitutively necessary or constitutively sufficient. And in each case, the condition is capable of generic application—to arbitrary objects of a given sort and not merely to individual objects. Ground has often been regarded as a constitutive form of sufficient condition. But what the parallel brings out is a complementary treatment of essence as a constitutive form of necessary condition. What it also brings out is the need for a deep form of genericity in each case.

The notions of necessary and sufficient condition are often regarded as converses of one another; for X to be a sufficient condition of Y is for Y to be a necessary condition of X. But the present view is one in which a condition is taken to be *determinative* of what it is a condition for; thus, when X is a sufficient condition for Y, Y will not in general (and perhaps will never be) a necessary condition for X since that would require both that X be determinative of Y and that Y be determinative of X. Similarly, when X is a necessary condition for Y, Y will not in general (and perhaps will never be) be a sufficient condition of X.[9]

Not only are the relations of necessary and of sufficient condition not converses, it is hard to see how either could be defined in terms of the other. One might have thought that a necessary condition would always be implied by—or be a 'part' of—any sufficient condition or that a sufficient condition would be one implying—or 'containing'—every necessary condition. But a statement may lack a sufficient condition though still admitting of some (though not all) necessary conditions. That x is a man, for example, may be constitutively necessary for x to be Socrates (i.e., Socrates may be essentially a man) even though there is no constitutively sufficient condition for x to be Socrates, or truth may be constitutively necessary for knowledge even though there may be no constitutively sufficient condition for knowledge of which truth is a part. Similarly, x being a man may imply all necessary conditions for x to be Socrates without itself being a sufficient condition for x to be Socrates.

Of special interest is the case in which we have both a necessary and sufficient condition. Thus x and y having the same members, in the case of two arbitrary sets x and y, is constitutively necessary and sufficient for x to be identical with y; that is, it is both essential to the sets being the same and something in virtue of which they are the same or, to take a more familiar example, x being an unmarried man is constitutively necessary and sufficient for x to be a bachelor. Using $\varphi \leftrightarrow \psi$ for $(\varphi \leftarrow \psi) \wedge (\varphi \rightarrow \psi)$, we might symbolize the first as:

$$[\text{Given } x,\, y \text{ where } \mathrm{Set}(x) \wedge \mathrm{Set}(y) : \forall z(z \in x \equiv z \in y) \leftrightarrow_{x,y} x = y]$$

and the second as:

$$[\text{Give } x \text{ and } y : \mathrm{Unmarried}(x) \wedge \mathrm{Man}(x) \leftrightarrow_{x} \mathrm{Bachelor}\,(x)].$$

It is important to note that the 'equivalence' operation $\leftrightarrow$ is not symmetric and, indeed, is most plausibly regarded as asymmetric. For the left-hand side is meant to be determinative, both as a necessary and as a sufficient condition, of the right hand side—and this is incompatible with the right-hand side also being determinative of the left-hand side. Thus x being an unmarried man will be constitutively necessary and sufficient for x to be a bachelor, while x being a bachelor will not in the relevant sense be constitutively necessary and sufficient for x to be an unmarried man.

Philosophers have often wanted to express statements of essence in what appears to be the form of identities. Thus, they have wanted to say in response to the question 'what is water?', that water is H_2O, although they have not wanted to say in the same sense that H_2O is water since that is not an account of what H_2O *is*. But, of course, if these statements of essence are genuine identities then it should be as equally acceptable to say that H_2O is water as that water is H_2O.

9 G. Strawson (1986: sec. 10.10) makes some similar remarks on the distinction between necessary and sufficient conditions and also draws the distinction between constitutive and causal conditions considered below.

What I would like to suggest is that we interpret the claim that water is H_2O as the claim that something's being H_2O is constitutively necessary and sufficient for it to be water. In symbols:

$$x = H_2O \leftrightarrow_x x = \text{water}.$$

And, in general, we interpret the claim 's IS t', for essentialist *IS* and nominal terms s and t, as the claim that something's being t is constitutively necessary and sufficient for it to be s:

$$x = t \leftrightarrow_x x = s.$$

The essentialist *IS* will then inherit the asymmetry of the equivalence operation, and it will actually be incorrect to say that H_2O IS water, given that water IS H_2O.

Statements of equivalence seem to correspond very well to reductive analyses or definitions. I have previously suggested that definitions, either nominal or real, might plausibly be taken to correspond to statements of essence (simply involving the reverse arrow '$\leftarrow$'). What I would now like to suggest is that reductive definitions be taken to correspond to real definitions in which the arrow can be reversed, so that we have what is both a constitutively necessary and a constitutively sufficient condition for something to hold.

Some authors (they include Dorr 2013 and Rayo 2013) have also worked with a notion of definition as a form of necessary and sufficient condition. But their notion has been symmetric, and they have attempted to define the separate notions of necessary and of sufficient condition in terms of the joint notion of a necessary-and-sufficient condition. As I have mentioned, our notion of a necessary-and-sufficient condition is not symmetric; moreover, there seems to be no reasonable prospect of defining the separate notions of necessary and of sufficient condition in terms of the joint notion. We cannot, for example, take φ to be constitutively sufficient for ψ when φ is constitutively equivalent to $\varphi \wedge \psi$, for, granted that φ is constitutively necessary and sufficient for $\varphi \wedge \varphi$, it would then follow that φ is constitutively sufficient for φ, in violation of noncircularity. Similarly, we cannot take φ to be constitutively necessary for ψ when φ is constitutively equivalent to $\varphi \vee \psi$, given that φ is constitutively necessary and sufficient for $\varphi \vee \varphi$.

It therefore appears that under the present approach the notions of necessary and sufficient condition should be taken as separate primitives and that the notion of necessary-and-sufficient condition should be defined in terms of them rather than the other way around.

5.

In conclusion, let me mention a number of possible ramifications of the present approach.

First, little has so far been said about the logic of the two notions. Logics should be developed for each of the two notions considered separately and for the two notions taken together; and the resulting logics should be compared with existing logics for ground. There will be some obvious parallels in the logics for the two notions. Thus, we will have noncircularity principles:

$$\frac{\varphi \leftarrow_{x,y,\ldots} \varphi, \psi_1, \psi_2, \ldots}{\bot} \qquad \frac{\psi, \varphi_1, \varphi_2, \ldots \rightarrow_{x,y} \psi}{\bot}$$

for both essence and ground, telling us that contradiction will ensue from an explicit circularity. We will also have transitivity principles in each case and their extension to 'Cut'.

There is a lack of parallel over 'Weakening'. The following inference is valid for essence:

$$\frac{\varphi \leftarrow_{x,y,\ldots} \psi_1, \psi_2, \ldots}{\varphi \leftarrow_{x,y,\ldots} \psi, \psi_1, \psi_2, \ldots}$$

(a necessary condition for some statements is also a necessary condition for those statements plus another statement) though the corresponding principle for ground:

$$\frac{\psi_1, \psi_2, \ldots \rightarrow_{x,y,\ldots} \varphi}{\psi, \psi_1, \psi_2, \ldots \rightarrow_{x,y,\ldots} \varphi}$$

is not valid. Parity between the two cases can perhaps be restored by following Gentzen in his treatment of sequents and allowing both essence and ground to be many-many connectors (notated as: $\varphi_1, \varphi_2, \ldots \leftarrow_{x,y,\ldots} \psi_1, \psi_2, \ldots$ and $\varphi_1, \varphi_2, \ldots \rightarrow_{x,y,\ldots} \psi_1, \psi_2, \ldots$) with a disjunctive interpretation of the consequents and a conjunctive interpretation of the antecedents. We will then have Consequent Weakening for ground:

$$\frac{\varphi_1, \varphi_2, \ldots \rightarrow_{x,y,\ldots} \psi_1, \psi_2, \ldots}{\varphi_1, \varphi_2, \ldots \rightarrow_{x,y,\ldots} \psi, \psi_1, \psi_2, \ldots}$$

in analogy to Antecedent Weakening for essence and yet fail to have Consequent Weakening for essence in analogy with the failure of Antecedent Weakening for ground.

It is natural to suppose that some sort of duality might hold. Given a principle P concerning essence and ground, its dual P$*$ will be the result of interchanging each occurrence of $\varphi \rightarrow \psi$ with $\psi \leftarrow \varphi$. Duality then states that P is valid just in case P* is valid. Duality leads to some interesting results. Consider, for example, the following inference:

$$\frac{\varphi \leftarrow \psi}{(\varphi \leftarrow \psi) \leftarrow \psi}$$

(given that φ is essential to ψ, then it is essential to ψ that φ is essential to ψ), which corresponds to the S4 axiom for essence. Its dual is:

$$\frac{\psi \rightarrow \varphi}{\psi \rightarrow (\psi \rightarrow \varphi)}$$

(given that ψ grounds φ then ψ grounds ψ being a ground for φ), which has sometimes been proposed as a principle governing the ground of grounds.

Second, once we conceive of essence as constitutively necessary conditions and ground as constitutively sufficient conditions, the question arises as to how far the parallel between them extends. One further possible source of parallel concerns the distinctions between strict and weak ground and between full and partial ground considered in Fine (2012). This makes it natural to consider analogous distinctions for essence. Thus, we might say that φ is constitutively necessary for φ in the weak sense or even that φ is partially constitutively necessary for φ ∨ ψ (given that φ, ψ is fully constitutively necessary for φ ∨ ψ).

Another possible source of parallel concerns the distinction between constitutive and consequential essence, a distinction made in Fine (1995a).[10] Again, this suggests that there may be an analogous distinction between constitutive and consequential ground. Under consequential ground, logic is, so to speak, of no account. Thus given that p grounds q, it will be acceptable to say that any logical equivalent of p grounds p or that p grounds any logical equivalent of q. The parallels between the two notions calls for further investigation, and I would certainly not to wish to suggest that the analogy is perfect in all respects. In particular, I am still tempted to tie the notion of necessity to essence (or constitutively necessary conditions), as in Fine (1994), and not to bring ground (or constitutively sufficient conditions) into the picture.

Third, the discussion has so far concerned constitutively necessary and sufficient conditions but one might well think that analogous considerations should apply to necessary and sufficient conditions within the causal sphere. Three points are worth emphasizing. The first is that causally necessary and sufficient conditions are also determinative, and so just as one should not take constitutively necessary conditions to be the converse of constitutively sufficient conditions, so one should not take causally necessary conditions to be the converse of causally sufficient conditions. Thus, the presence of oxygen may be a causally necessary condition for the match to light, but the match lighting is not a causally sufficient condition for the presence of oxygen. The second point relates to background conditions (as discussed in Fine 2014). Certain conditions may provide a background to other conditions having a determinative role even though they do not themselves play a determinative role. Thus, given the background condition that person *P* exists at one time *t* and person *Q* exists at another time *t′*, *P* at *t* being psychologically continuous with *Q* at *t′* might well be taken to be a ground for *P* being identical to *Q*, even though *P*'s existing at *t* or *Q*'s existing at *t′* do not themselves help make *P* be identical to *Q*. It is clear that background conditions also play an important role in the causal sphere. Thus when we consider the behavior of a 'closed' system, the background condition is that there is no external interference, and our interest is in how the system behaves, that is, in what determines the behavior of the system when this condition is met. Third, there is an obvious role for genericity in the statement of causal connections. Thus we may say that smoking causes cancer, thereby intending to invoke a causal connection between the generic condition of a person smoking and the person's contracting cancer or we may talk of a 'random' variable, thereby indicating that there is nothing (within the chosen subject matter)

10 I thank Michael Raven for pressing this point upon me.

that is determinative of its value. But whether the role of the genericity in the two cases is the same is rather hard to say and calls for further investigation.

Finally, the present treatment of essence and ground relates to some broader metaphysical concerns. I began by declaring that there were two major explanatory tasks in metaphysics—the task of accounting for the identity of objects and the task of providing a ground for truths. I do not wish to deny that this is so, but I now see the first task as part of a more general task of providing generic explanations. When the explanandum is the identity of an arbitrary object to some specific object and when the explanans is to be given as a constitutively necessary condition not involving the object itself, we obtain what may well be regarded as an explanation of identity, an explanation of what the object is. But these explanations are continuous along one dimension with explanations of other generic conditions, continuous along a second dimension with explanations stating constitutively sufficient rather than constitutively necessary conditions, and continuous along a third dimension with explanations of truths rather than conditions. Thus, the two tasks do not represent distinct explanatory aims but are merely two different poles along a single explanatory endeavor.

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