GRAEME FORBES

ORIGINS AND IDENTITIES*

1. A CRITERION FOR CROSSWORLD IDENTITY

Kripke's thesis of the *essentiality of biological origin* (Kripke 1972, pp. 312–4) may be written

(EBO) $\Box(\forall x)\Box(\forall y)[\Diamond(y$ originates from $x) \rightarrow \Box(y$ exists $\rightarrow y$ originates from $x)$.[1]

That is, for any possible objects x and y, if y originates from x in some world, then y originates from x in every world in which y exists. This thesis strikes an intuitive chord with many, and a number of proposed justifications for it have been advanced.[2] My own argument for EBO is based on a principle about identity, namely, that for things which in some good sense *come from* or are *composed of* or *constructed from* other things ("composite" objects), *ungrounded identities* and *ungrounded non-identities* are to be abjured.

Ungrounded identities of composite objects, if they were possible, would be cases where an identity holds though there is nothing in which it consists. For instance, if an individual O has physically and functionally equivalent brain-hemispheres and undergoes successful hemisphere transplants that produce two new individuals Lefty and Righty, that $O =$

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1. Assume that x is restricted to organisms which originate from a single entity.

2. See, for example, Mackie (1974), McGinn (1976) and Salmon (1981). Kripke himself gave 'something like a proof' of a related thesis about the matter of which a table is composed, in endnote 56 of Kripke 1972, where it is printed in 'inexplicably garbled' form (Kripke 1980, p. 1). An erratic reader of endnotes, I was unaware of it until it appeared, corrected, in Salmon (1979). By then I had already devised a similar argument about acorns and oak trees, which appeared in print in Forbes (1980a,b).

Lefty or that $O =$ Righty would be examples of ungrounded identities.[3] The symmetry makes each identity hypothesis unintelligible in the context of the case, unless we surreptitiously posit a symmetry-breaker, such as an immaterial soul.

Ungrounded non-identities of composite objects, if they were possible, would be cases in which we satisfy all conceivable conditions for the identity of x and y not logically entailing it, but still, $x \neq y$.

However, not any old condition can be a ground for an identity or a non-identity. As a first approximation, grounds for identity and non-identity must be *intrinsic*, not *extrinsic*. This means, among other things, that whether or not $x =$ the ϕ should not turn on the presence or absence at the relevant time or world of some entity that is causally isolated from the ϕ.[4]

My primary argument for EBO is that denying it produces ungrounded identities and non-identities. But a defense in these terms is only as strong as the alleged principles about identity that EBO is shown to save. An important principle in the present context, one that we will ultimately qualify in a modest way, is that *indistinguishability of intrinsic nature across worlds suffices for identity*. More carefully, let us write $x@w$ to mean, until further notice, the part of the intrinsic nature of x at w which does not logically imply the identity of its bearer (so it may be that, at some world, y satisfies $x@w$ though $y \neq x$). Then EBO preserves the following consequence of the sufficiency for identity of crossworld intrinsic indistinguishability:

(1)   If $u \neq v$ and $w^\dagger$ and $w^\ddagger$ are each distinct from u and v, then if at $w^\dagger$, a satisfies $x@u$, and at $w^\ddagger$, b satisfies $x@v$, then $a = b$.

Granted, if *intrinsic* just means *non-relational*, principle (1) is not very plausible. No doubt there are cases of non-relational indistinguishability

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3. For a defense of such primitive identities, see Chisholm (1970).

4. Exclusion of extrinsic grounding follows from Wiggins' slightly stronger *Only a and b* principle (Wiggins 1980, p. 96): '…if *identity* is what we want to elucidate, [we need] a criterion which will stipulate that for a relation R to be constitutive of the identity of *a* and *b*, *a*'s having R to *b* must be such that objects distinct from *a* or *b* are irrelevant to whether *a* has R to *b*.' So R could not include an 'absence of a better candidate' provision. Wiggins and I would both disagree with Mr. Justice Otton of the Scottish High Court, in the celebrated case of Middlebridge Scimitar Ltd *versus* Edward Hubbard. 'Mr. Hubbard…was granted a court order enforcing an agreement under which Middlebridge…agreed to buy [the Bentley racing car Old No. 1 from him]…for £6.8 million…The case centred on whether Mr. Hubbard's car was the one which sped the diamond heir Capt Wolf Barnato to victory at Le Mans in 1929 and 1930 or whether it had undergone so much rebuilding it was no longer the genuine article. Middlebridge…said it had been promised the Le Mans winner—and the [Hubbard] Bentley was not that car because it had been completely rebuilt by a master mechanic' (*The Scotsman*, 28 July 1990). The crucial consideration in his finding against Middlebridge, according to Otton, was that 'there is no other Bentley, extinct or extant, which could legitimately lay claim to the title of Old No 1…' And they say analytic metaphysics has no practical application.

that nevertheless involve distinct objects. For instance, if *a* and *b* are, say, identical twins, the non-relational part of the life of either should be possible for the other. So there are $w^\dagger$, $w^\ddagger$, *u* and *v* as required such that the antecedents in (1) hold; but *a* is not *b*.

However, there is a broader notion of *intrinsic* in the literature, according to which some relational properties of a thing can be part of its intrinsic nature.[5] For example, if *x* is a bicycle and *y* one of its wheels, it is intrinsic to *x* to have *y* as a part (thought not intrinsic to *y* to be a part of *x*). And it is intrinsic to {*x*} to have *x* as a member (though not intrinsic to *x* to be a member of {*x*}).[6] In the same spirit, if *x* is an organism which develops from a single propagule *y* (the term *propagule* was suggested to me for these purposes by Richard Dawkins), it is intrinsic to *x* to develop from *y*. After all, there is a phase of *x*'s existence when it is entirely constituted by *y* (in the case of humans, simplifying the facts, a zygotehood).[7] Extending this to multi-propagule organisms is a small step, trading *entirely constituted by* for *partially*. With *intrinsic* understood in this way, (1) becomes much more plausible.[8]

Still, for those who are uncomfortable with the broader notion of *intrinsic*, there is a way of reading (1) which does not beg any of the questions addressed in this paper. If interior properties are not intrinsic in an acceptable sense, they are at least *identity-relevant*. And the main issue we face is whether there is any combination of properties *at all* that uniquely determines the identity of a satisfier without logically entailing it. So there is no

5. Humberstone refers to intrinsic properties in this wider sense as *interior*. See Humberstone (1996), p. 239–40 for discussion of this sense, attributed to Dunn (1990), and the whole paper more generally for an instructive discussion of the intrinsic/extrinsic distinction.

6. Fine (1994) identifies the asymmetry in this case with *essential/accidental*, and rejects the modal account of *essential property* on the grounds that it does not discriminate $\Box \lambda z.z \in \{x\}(x)$ and $\Box \lambda z.x \in z(\{x\})$. But if the fundamental asymmetry is *intrinsic/extrinsic*, we need a further argument that all essential properties must be intrinsic before this difference can overturn the modal definition.

7. Yablo (1999, p. 486) says that 'on almost anybody's account,' the zygote *z* from which he (Yablo) developed stopped existing before he started, so descending from *z* is extrinsic to him. Perhaps it is well to separate persons and their bodies, in which case we can still say that it is intrinsic to Yablo's body to develop from *z*, since Yablo's body came into existence with *z*, even if it took a while for Yablo to occupy it. Yablo goes on to say that since part of what it takes to be Yablo is to descend from *z*, being Yablo is extrinsic to him as well. This is a sense of *extrinsic* on which I have no secure grip.

8. A counterexample which might be thought to survive the addition of relational elements to intrinsic natures involves Felix, a cat which exists in *u*, and Felix-minus, that portion of Felix in *u* which lacks a tail. Let *v* be a world in which Felix is just as in *u* except for not growing a tail. Then Felix-minus@*u* and Felix@*v* are numerically identical, thus by (1), so are their satisfiers. But Felix-minus and Felix are distinct entities in the domain of *u*, since only one has a tail. To this I would reply that Felix-minus@*u* and Felix@*v* are *not* numerically identical. For one thing, Felix@*v* includes *being a cat*, while Felix-minus is no cat. Still, some would regard being a cat as extrinsic to each cat (Yablo, *loc. cit.*). But there is still an intrinsic difference between a natural entity and one which is a mereological abstraction from a natural entity; it is not clear that Felix-minus is even an organism.

harm in reading the notation $x@u$ in (1) to include all the identity-relevant features x possesses at u, including relational ones, as well as those that are intrinsic in a narrow sense, so long as we continue to exclude anything that logically entails the identity of a w-satisfier of $x@u$. Nor need we attempt a definition of *identity-relevant*, since our case for EBO ultimately hinges on a controversy about what can count as identity-relevant, that is, on the details of particular candidates.

2. THE ARGUMENT FOR EBO

The argument that EBO preserves (1), or at least blocks a particular kind of counterexample to it, is as follows. Suppose EBO is false. Then there are a, w_1, w_2, p_1 and p_2 (all distinct) such that a's propagule in w_1 is p_1 and a's propagule in w_2 is p_2. We also suppose that w_2 is as little different as possible from w_1. Then there is w_3 where a develops from p_1, and also

(2) $\diamond (\exists x)(\exists y)(x \neq y \wedge x \text{ satisfies } a@w_3 \wedge y \text{ satisfies } a@w_2)$.

That is, there is w_4 (corresponding to $\diamond$ in (2)) in which x duplicates a as it is at w_3 in every relevant respect, and y duplicates a as it is at w_2 in every relevant respect (call w_4 a *two-candidate* world). The crucial requirement is that the way a is at w_2 and the way a is at w_3 are sufficiently different that they are ways for distinct things to be in the same world. Since a cannot be both of these things, we have a contradiction with (1) ($w_4 = w^\dagger = w^\ddagger$).

For a more general perspective, say that a property is *exclusive* iff necessarily, at most one thing possesses it. To show, given (1), that an exclusive property P is essential to a, assume it is not and thereby generate a way for a to be, $a@w_2$, in which a is not P. Then find another way $a@w_3$ for a to be such that in some world, distinct objects satisfy $a@w_2$ and $a@w_3$. But how do we know that there is such an $a@w_3$? In any given case the existence of $a@w_3$ is open to intuitive demonstration. For example, if a is an oak tree and p is its actual propagule-acorn, then since $a@w_2$ is as similar as possible to $a@the\ actual\ world$ consistent with q replacing p, $a@w_3$ could be a way for a to be involving developing from p at a different place or time from its point of origin in w_2. This leaves enough "room" for $a@w_2$ to be satisfied by one thing while $a@w_3$ is satisfied by another at some two-candidate world w_4.

For $a@w_3$ to leave enough room for co-satisfaction with $a@w_2$ in a two-candidate world, the exclusive properties of a in w_2 must *all* be accidental to a. For if some exclusive Q in $a@w_2$ is essential to a, it must also be in $a@w_3$, and hence (by definition of *exclusive*) there is no world where some x satisfies $a@w_2$ and some distinct y satisfies $a@w_3$. Indeed, the exclusive properties of a in w_2 must be *non-distributive-all* accidental – there must be worlds where a lacks all of them (and w_3 must be such a world). For if

not, some exclusive Q is common to $a@w_2$ and $a@w_3$, again ruling out two-candidate worlds where $a@w_2$ and $a@w_3$ are satisfied by distinct things. These contingency requirements on exclusive properties might seem onerous. On the other hand, in the hypothetical case of the oak-tree a and its propagule acorn p, there doesn't seem to be any difficulty with the claim that in w_3, a's exclusive properties are all different from those it has in w_2. So we shall assume that the contingency requirements can be met.

Since denying EBO leads to a two-candidate world, contradicting (1), this provides EBO with a rationale, that of maintaining consistency with (1). Nor can the sceptic about EBO accept a weakened version of (1), according to which it only applies when there is just one candidate, with origin, say, or overall intrinsic similarity, as the tie-breaker in two-candidate worlds. For this means that identity is extrinsically determined, the presence or absence of a (typically, causally isolated) second candidate being the key factor in some cases.[9]

The two-candidate world gives us a case of intrinsically ungrounded numerical difference (or difference ungrounded in intrinsic and identity-relevant properties – from here on this qualification is to be understood where appropriate). Since $x \neq y$, either x or y is distinct from a. If it is x, then in view of w_3, $x \neq a$ is intrinsically ungrounded, and if it is y, then in view of w_2, $y \neq a$ is intrinsically ungrounded. On plausible assumptions, we will also have intrinsically ungrounded identities, for surely there is some world or other where a satisfies $a@w_3$ and coexists with some b satisfying $a@w_2$. This ought to be a symmetry case as puzzling as the one about Lefty and Righty, but it is not. The moral appears to be that there is a problem with the alleged way a could have been, $a@w_2$, in which a has a biological origin different from its actual one.

3. ROBERTSON'S CRITIQUE

In an insightful discussion, Teresa Robertson (1998, p. 743) has recently objected that this argument cannot justify EBO specifically, since many different essentialist principles besides EBO preserve (1), including some very unattractive ones. Suppose that a tree T actually grows a branch b. The *essentiality of branching* (EBR) says that it is essential to T to grow b. We may therefore imitate the reasoning of the previous section to show that deny-

9. The causal isolation is clear enough in this case, since there is no reason why an organism originating from a propagule p must causally interact with one originating from a different propagule q. It is a further problem to give a precise account of causal isolation that is of use in harder cases. Also, something with a certain origin cannot be made the best candidate for identity with a certain entity simply by throwing in some causal interaction with its rivals: the causal interaction would have to be somehow in the nature of the case.

ing EBR generates a conflict with (1) and creates false symmetry cases.[10] At w_2, T lacks b, contradicting EBR. w_3 is chosen so that $T@w_2$ and $T@w_3$ are different enough for there to be a world w_4 in which they are satisfied by distinct things x and y. T cannot be both x and y, hence (1) fails. So much the worse, a defender of EBR will say, for the postulation of w_2, where T lacks b: T cannot lack b. But it is obvious that we do not want to endorse EBR, for an actual tree could have ceased to exist before it developed any one of its branches.

If we insist on EBO, we can block the argument for EBR just given. w_2 is supposed to be as similar as possible to w_1 consistent with T failing to grow b. If EBO is in force, T has the same propagule in w_1, w_2 and w_3. Assuming this propagule cannot give rise to more than one thing of T's kind in a world,[11] a two-candidate world therefore cannot be generated. (This simply reflects the earlier observation that the exclusive properties of $a@w_2$ must be accidental to a if a two-candidate world is to be produced.)

However, this way of blocking the argument for EBR raises two serious problems for the defender of EBO. First, one who advocates EBR might well be offering an *alternative* to EBO; the principles are symmetric as far as preserving (1) is concerned, and a defender of EBR can equally object to the argument for EBO that if T must have the same branches in the one-tree worlds and growing a given branch is exclusive, the two-candidate world that is supposed to embarrass the sceptic about EBO cannot be generated. Evidently, we need to find independent grounds for picking one essentialist thesis over the other. Call this the *Bias Problem:* of the candidate principles that do the work of protecting (1), why prefer EBO to the others?

Secondly, there is the problem raised by Robertson (p. 745). Suppose the matter constituting T's propagule p in w_1 can in some way be "recycled" into an intrinsically indistinguishable zygote that exists later (see further Price 1982).[12] Then a more plausible biological origin essentialism may not even block the argument for EBR. For a more plausible essentialism would allow T to emerge in w_3 from a recycling of p's matter. But in that

10. Robertson's actual example is essentiality of leaf-color. However, if we choose a nonexclusive property, insisting on its essentiality as an alternative to EBO will not block every counterexample to (1). For example, we can suppose that the colors of a, x and y in the argument for EBO are all the same; we still get a counterexample to (1). (I assume that growing b is exclusive.)

11. Monovular twinhood is not a counterexample to this assumption. *Pace* Robertson (p. 735, n.11) I would say that the propagules from which identical twins originate are the two daughter cells resulting from the non-standard mitotic division of the zygote.

12. Despite the obvious echoes of the Ship of Theseus, I think that organisms contrast with artifacts in important relevant ways. An organism can persist through a complete change of its matter. But while a ship may undergo repairs at certain times, so that ultimately there is a ship whose matter is entirely different from the original ship's matter, I have never seen a good reason to hold that a single ship that persists through such a process, Justice Otton notwithstanding. Fear of vagueness is often the main motivation; see the discussion of the Mac of Forbes in Forbes (1987).

case, $T@w_3$ does leave room for co-satisfaction with $T@w_2$, and we get our two-candidate world even despite insisting on biological origin essentialism. So to protect (1), EBR, or something just as bad, is needed anyway. Call this the *Recycling Problem*. I take it first.

4. THE RECYCLING PROBLEM

Perhaps a recycled propagule is numerically identical to the original propagule. But in addition to making biological origin a non-exclusive property, this would be unnecessarily controversial, and Robertson does not assume it. It would be controversial because a propagule, being an organism, can undergo a complete change of matter, so the recycled propagule might be made of the matter of the original propagule while the latter still exists. Thus a judgment of identity between the original and the recycled propagule makes identity extrinsically determined, since it can only be maintained if a propagule continuous with the original one does not still exist.[13]

So $p_1 \neq p_2$. However, if p_2 is recycled from p_1's original matter and $p_1 \neq p_2$, then EBO *does* block the four-worlds argument for EBR: the three one-tree worlds across which T's branches vary use the very same propagule p for T if EBO is in force. And originating from p is still an exclusive property if recycling can at best produce a q distinct from p. So as before, no two-candidate world will be available with which to embarrass the EBR-sceptic. We can be brazen about our EBR-scepticism.

Robertson's response to this, one which I would have made myself (Forbes 1986, p. 7–8) until I saw its consequences spelled out in her paper, is that in requiring that it be the very same propagule that a one-propagule organism originates from in every world in which it exists, EBO is simply too strong: we should be willing to allow a recycled version of that propagule to serve as well. But is it *really* possible for me to have originated from a cell which is a molecule-for-molecule reincarnation of the zygote from which I actually originated, even though not identical to it? Offhand, it *seems* possible, but we are no strangers to the phenomenon of something that initially seems possible coming to seem impossible on careful reflection.[14] Moreover, I have no strong intuition about such a recycling case: my strong intuition is that *I* could not have originated from *your* zygote,

13. However, it is not so clear that an appropriate causal isolation condition is met in this case (cf. note 9). So some might try to defend this kind of extrinsic determination, as is familiar from the Ship-of-Theseus literature; see, e.g., Garrett (1988), and the response in Mackie (1989).

14. For example, it seems possible that I might have been an identical twin. But reflecting on the symmetry of mitotic division, the hypothesis that there is a world where I am one and not the other of a pair of twins seems no better than the hypothesis that O is identical to Lefty or else to Righty. See (Forbes 1980a, pp. 353–5) for further discussion of twinning.

that is, that Kripke's judgement about his *Queen/child of the Trumans* case is correct (Kripke 1980, p. 112). Comparing this ordinary case to a science-fiction case involving recycling, what is apparently the crucial feature of the ordinary case is preserved on Robertson's assumptions, namely, that I originate from different zygotes in different worlds (no doubt Robertson would just say that the crucial feature missing from the ordinary case is that the alternative zygote is a recycled copy of the actual one).[15] Then given that the science-fiction case does not reveal some fallacy in our thinking about the ordinary case, or enthymeme that makes the ordinary case a special case, it is reasonable to extend verdicts about the ordinary case to the science-fiction case. In addition, weakening EBO to allow recycled substitutions produces an essentialism that fails to protect (1), as we have seen. But preservation of (1) or something close to it is our only candidate for a deep rationale that principles like EBO could have, and without (1), it is unclear how we close the door on ungrounded identities and differences such as those among *O*, Lefty and Righty. So there is also a theoretical reason to disallow originating from a propagule in one world and a mere copy of it in another.

5. EXTRA-STRENGTH HAECCEITISM

Recycling cases pose a more direct threat to a defense of essentialist theses like EBO that depends on the rejection of ungrounded identities and non-identities for complex things. Tom McKay (1986) has argued that we can use a pair like $\{p, q\}$, q recycled from p, or else a pair $\{X, Y\}$ of organisms that p and q give rise to respectively, to construct strong counterexamples to principles like (1). For it seems that q does not depend for its existence on p (call this the *independence thesis*). And since p and q are things of the same kind, the same possibilities not involving the other should be open to each. So in addition to a world where they both exist, for different but overlapping periods, there are worlds u and v which are factually the same except that p but not q exists in u, and q but not p exists in v, and there are no other differences except those logically entailed by this one. Hence $p@u$ is numerically identical to $q@v$, but $p \neq q$. (It also follows that particular identities can hold at two-candidate worlds despite the symmetry of the two candidates for identity with (say) p.) Note that McKay's case is a counterexample to (1) whether we construe *intrinsic* narrowly or broadly, and would not be affected by any definition of *intrinsic* or *identity-relevant* that

we might come up with: regardless of how we understand '*p@u*', so long as it excludes properties which logically entail the identity of any satisfier, McKay's case is a counterexample.[16]

Let us use *extra-strength haecceitism* for the view that two worlds *u* and *v* can be isomorphic under a function that sends everything that exists in *u* to itself, with exactly one exception.[17] There is a variant of my argument in defense of EBO which suggests that denying EBO leads directly to extra-strength haecceitism. Let *A*, which actually originates from *p*, originate from *q* in *w*. There is no reason why *q* could not have given rise to some *B* distinct from *A* (suppose in the actual world it does), so let *u* be a world where *q* gives rise to such a *B*. Again, it is hard to see why *B@u* should not be a way *A* could have been, so there is *v* where *A* satisfies *B@u*. And apart from the fact that in *u* it is *B* that satisfies *B@u* while in *v* it is *A*, there need be no differences between *u* and *v* beyond those necessitated by this one. This argument in defense of EBO (at least it is such in the eyes of those who wish to resist ungrounded identities and non-identities) has some advantages over the four-worlds argument of §2, particularly in connection with non-standard modal semantics.[18] But it has the same problems with recycling (as well as bias). Suppose we use the same reasoning in defense of EBR. We have an *A* which actually grows *b* and, according to the sceptic about EBR, a *w* where *A* does not grow *b*. Let *u* be a world where a distinct tree *B* does not grow *b*. We require that *B@u* is a way *A* could have been, and if we are assuming EBO this means *B@u* has to include an origin possible for *A*. We could just stipulate that at *u*, *B* originates from *A*'s actual propagule, but this is a weak point in the defense of EBR if it is only a stipulation. A recycling scenario strengthens the point.

More importantly, arguing that scepticism about EBO leads to extra-strength haecceitism need not embarrass the sceptic if there is nothing ac-

16. Mackie (1987) endorses extra-strength haecceitism, though without the benefit of supporting examples like McKay's. She seems to agree with my verdict about the Lefty/Righty case, but argues that there is no reason to insist on parallel treatments of transtemporal and transworld identity (pp. 197–8). But I would say that identity is identity. If *the thing which is F is identical to the thing which was G* (wide-scope tense) requires grounds, then *the thing which is F is identical to the thing which would have been G if…* (wide-scope modal) must also require grounds.

17. *Exactly one* is too strong, since one bare difference can give rise to others, if the primitively distinct entities are parts of other entities. I ignore this complication.

18. Hawthorne and Gendler (2000) raise the interesting and complicated question of what happens to the defense of EBO in a counterpart-theoretic framework, where it seems that a two-candidate world would just be a world with two *counterparts* of some actual entity, which is relatively unproblematic. But the new argument for EBO just given does not use two-candidate worlds, and in a counterpart-theoretic framework, shows that the counterpart relation would have to hold in some instances and fail in others even though there is no difference between these instances with respect to the factors that ground or determine (degree of) counterparthood. This is no improvement on ungrounded identity. I hope to pursue these issues, including the Faith-Hope-Charity/Peter-Paul-Mary case from (Hawthorne and Gendler 2000, p. 293), in another paper.

tually wrong with such haecceitism. Maybe McKay has shown that animus towards ungrounded identities and non-identities is mere prejudice. But extra-strength haecceitism has some commitments that seem unattractive (to me). There is a world *w* where a recycling process continues without end. Therefore extra-strength haecceitism implies that there are uncountably many possible worlds which are exactly the same except for the mere identities of certain organisms in them, one world for each infinite sub-sequence of recycled entities (or their products) from *w*. And there are infinitely many worlds where some dog (a different one for each world) primitively distinct from my neighbour's dog leads the dog's life my neighbour's dog actually leads, and all else is the same as it actually is.

This proliferation of worlds is startling, and the culprit seems to be the independence thesis, that *q* does not depend for its existence on *p*. Suppose that in *w*, a zygote *p* consists of matter *m* in configuration *c* recycled from an original zygote and a later zygote *q* consists in the same matter in the same configuration recycled again (all three zygotes are *m-c zygotes*). Assume there is a world *u* where *p* is the only *m-c* zygote and a world *v* where *q* is the only *m-c* zygote and all else is as close as possible to *u*. If we think of a possible world as an unfolding course of events, this extra-strength haecceitist scenario implies that there are two courses of events that share an initial segment to the point where certain molecules are brought together in a certain way in an event *e*, but at that point the courses of events branch: in one it is *p* that comes into existence as a result of *e*, and in the other it is *q*. And there are no other differences, then or subsequently, other than those necessitated by this one. This radical transcendence of the identity of the entity that *e* brings into existence seems to me to be as difficult to understand as an alleged identity between *O* and (say) Lefty, rather than Righty; it is another reason to doubt that *q* can exist even if *p* does not.

6. PREDECESSOR ESSENTIALISM AND INTRINSICNESS

To rule out extra-strength haecceitism we have to say that *q* needs *p*, and more generally that an entity's predecessors in a recycling sequence are its predecessors in every world where it exists.[19] One question about such *predecessor essentialism* is its plausibility, though in these recherché cases it is not easy for modal intuition to get a grip. Subsuming the plausibility issue is the question whether or not endorsing predecessor essentialism undercuts (1). '*x@u*' now has to be understood to include information about the number of predecessors, if any, of *x*, in the sense of *predecessor*

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19. See further Forbes (1994). Another proposal is that in certain cases there is no fact of the matter about transworld identity. But this position does not seem to change the issues in any significant way, (though it does complicate the possible-worlds semantics).

that means, when *x* is a propagule, having the same matter configured in the same way, and when *x* is a propagule-product, having developed from a propagule with such a predecessor. Are we to say that the number of predecessors of a propagule *y* satisfying *x@u* or a product *z* of such a propagule is an *intrinsic* property of *y* or *z*? Or even, weaker though it is, that it is so much as *relevant to the identity* of *y* or *z*?[20]

To begin with intrinsicness, I will look at some recent discussions of the intrinsic/extrinsic distinction to see what guidance they offer about whether *p*'s being the *n*'th *m-c propagule* in a world is intrinsic to *p*. We will see that the proposed criteria either fail to settle the issue unequivocally, or their delineation of intrinsic/extrinsic is independently objectionable.

Vallentyne (1997) develops the idea that an intrinsic property *P* is one with respect to which an object *x* remains stable (*x* does not acquire, or lose, *P*) under arbitrary deletion of parts of the world that are external to *x*. Specifically, say that for any *x*, *w*, and *t* such that *x* exists in *w* at *t*, an *x-t contraction* of *w* is obtained by removing as much as possible of *w* save *x*, *t*, *x*'s location at *t*, and things not wholly distinct from *x*. Then Vallentyne proposes

(3) *P* is intrinsic $=_{df}$ $\forall$ *w, t, x:* (a) if *Px* at *t* in *w* then *Px* at *t* in each *x-t* contraction of *w*; (b) if ¬*Px* at *t* in *w* then ¬*Px* at *t* in each *x-t* contraction of *w*.

This criterion makes being the first *m-c* propagule extrinsic to any *p* that has it in *w*, using (3b): in *w*, if *p* is not the first *m-c* propagule, we can contrive an *x-t* contraction of *w* in which *p is* the first *m-c* propagule simply by deleting *p*'s *m-c* predecessors from *w*. (3) also makes being the *k*'th *m-c* propagule, $k \geqslant 2$, extrinsic to any *p* that has it in *w*, using part (a) and the same *x-t* contraction of *w*.[21]

However, matters are less clear cut if we focus on *m*, which persists, if in distributed form, through various episodes of constituting propagules. (3) makes it intrinsic to *p* to be initially constituted of *m*, and if it is also intrinsic to *m* not to have *c*-constituted any propagule before *p*, we have good reason to count it intrinsic to *p* to be the first *m-c* propagule.[22] Might it be

20. Hawthorne and Gendler (2000, p. 293) argue that "…the intuitive strength of the necessity of origins thesis surpasses that of [predecessor essentialism], so if the project is to generate arguments in favor of the former, it seems best not to invoke the latter". This might be so if we were trying to explain why EBO is *intuitive* and thought that a successful non-debunking explanation would have to access explicit reasons for holding EBO and portray EBO as inheriting its intuitiveness from those reasons. But in general, explaining why something plausible is *true* may require us to call upon non-obvious lemmas.

21. I interpret *not the first* to mean *the second or later*, excluding *not at all*. Certainly, if *p* is not an *m-c* propagule, contraction will not turn it into one.

22. Here I am assuming that at least for a range of intrinsic properties, if the constituting matter of *p* has them, so does *p* (the primary exceptions being properties involving *p*).

intrinsic to *m* not to have *c*-constituted any propagule before *p*? The negation of this property is unstable under *x-t* contraction so long as we are allowed to contract away the life of *m* prior to *t* ((3) does not allow this). But there is some plausibility in the thought that if at *t* it was intrinsic to *x* to be *F* then at a later *t′* it should be intrinsic to *x* to have been *F*. So the verdict of Vallentyne's criterion in application to our cases is not as unequivocal as it first seemed.

Yablo (1999) characterizes the intrinsic/extrinsic distinction within a modal framework broadly similar to Vallentyne's. Yablo takes a property *P* to be intrinsic iff

> (4)   For any possible *x* and world *w* in which *x* exists, *x* is stable with respect to *P* under augmentation of *w*; that is, if *w′* includes *w*, *Pxw* iff *Pxw′*.

Being the first *m-c* propagule is evidently extrinsic; for if *w* is a world where *p* is the first *m-c* propagule, we may simply wrap *w* in some further goings-on in which an *m-c* propagule appears before *p*. This also shows that being a subsequent *m-c* propagule is extrinsic: '*Pxw* iff *Pxw′*' fails when *w′* contains further goings-on in which an *m-c* propagule appears before *p*. On the other hand, as with Vallentyne's criterion, it is intrinsic to *p* to be initially constituted of *m* (not obviously a result Yablo wants); having not previously constituted a *c*-propagule is one of *m*'s extrinsic features; but *having* previously *c*-constituted a propagule will be *in*trinsic unless we are allowed to drop the relevant part of *m*'s history in choosing a *w* that is part of *w′*. On the face of it, this is not allowed by Yablo's mereological apparatus, which treats the way *x* is as a common part of *w* and *w′*: if pieces of the way *x* is at *w′* can be missing from *w*, why not pieces that include intuitively intrinsic features? Again, it looks as if the applicability of the proposed criterion to our cases is far from clear cut.

Another objection to Yablo's criterion of intrinsic/extrinsic that arises in the present context, one that also applies to Vallentyne's, is that application of it to the properties we are discussing is question-begging. This is because of a general difficulty accounts of "*P* is intrinsic/extrinsic" have with essential properties if those accounts turn on the stability of *P* with respect to *x* in some crucial class of worlds where *x* exists. For if *P* is essential to *x*, then inevitably *P* is stable with respect to *x* across the whole range of worlds in which *x* exists, whether or not those worlds are related as (3) and (4) require.[23] Therefore, a property like *being the first m-c propagule*

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23. Vallentyne bites the bullet on this issue (1997, p. 216–7). Yablo modifies (4) to get round the problem. According to (4) it is the truth-value of *Pxw ↔ Pxw′* that is criterial; in the revised version (Yablo 1999, p. 492) it is the truth-value of *Pxw ↔ Px′w′* that is criterial, where *x′* is whatever is constituted in *w′* by the basic elements of *w* that make up *x* (in *w*). But this makes the criterion harder to apply. For example, the new notion of *part* (p. 491)

can be shown to be unstable by accounts based on (3) or (4) only if it is not essential. But the whole point of appealing to (3) or (4) was to settle a lemma used *en route* to inferring that it *is* essential.

The general difficulty with approaches like (3) and (4), that essential properties are counted as intrinsic just because they are essential, motivates the very different approach of Francescotti (1999). He proposes that a property is extrinsic if it is based on a relation, except, in effect, if the relation is one of Humberstone's interior ones. So the problem is to filter these relations out of the group that will give rise to extrinsic properties. To do this, Francescotti introduces the idea of a *d-relational* property of *x*, which is a property of *x* consisting in a relation that is borne to a distinct thing *y*. *P* is an *impure* d-relational property of *x* if there are *R* and *y*, $y \neq x$, such that having *P* consists in being in *R* to *y*; *P* is a *pure* d-relational property if there is a relation *R*, a second-order property *X* and a quantifier *Q* such that having *P* consists in bearing *R* to *Q* of the *X*'s, and furthermore, possibly one of the *X*'s is not identical to *x*.[24]

Being the first *m-c* propagule would be extrinsic on this account if it consists in being the earliest of all the *m-c* propagules, and being a subsequent *m-c* propagule would be extrinsic if it consists in being the later of some two of the *m-c* propagules, or in originating after the first. The question is whether there is *anything* that will be counted as intrinsic on this approach. Why not say that squareness is extrinsic, since to be square consists in being one of the square things? Simply excluding identity and nonidentity from the possible values of *R* will not help, since in each case there will be other relations and/or properties that will do the job, for example, in the present case, being same-shaped with.[25] Nor is it sufficient to exclude being *R* to one of the *X*'s from consideration in evaluating *X* for intrinsicness (Francescotti 1999, p. 603), since even if $Y \neq X$, a thing may be *R* to one of the *X*'s iff it is *R* to one of the *Y*'s.[26] It seems that a much greater

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allows *w* to be a part of *w'* so long as there is some concept of *sum* such that *w'* is the sum of certain basic elements and *w* is the sum of a subset of those elements. It is not obvious that this will keep the *shape* of *x* the same in *w* and *w'* unless we make an *ad hoc* stipulation that only those notions of *sum* that don't allow basic elements to arrange themselves into a different shape are to be used. Since Yablo wants shape to be intrinsic (p. 480), such stipulations are apparently needed. And constituting matter *m* will still come out intrinsic to the entity *e* it constitutes, *contra* Yablo's intentions, unless the same basic elements can configure themselves as they are in *e* without thereby forming *m*. We will need a special notion of *sum* to justify this.

24. This is (c*) of (Francescotti 1999, p. 604) except that I have used a second-order variable *X* for a function from worlds to sets in place of the rigid class-term '*C*' in (c*), which renders the *possibly* pointless.

25. Francescotti's final version of his criterion says that *P* is intrinsic to *x* iff there are non-*d*-relational properties such that *x*'s having *P* consists in its having those properties. This doesn't affect the overgeneration problem.

burden must fall on the notion of *consisting in*, allowing us to decide between the following two accounts of *being the first m-c propagule:* that it consists in being the earliest of all the *m-c* propagules, or rather that it consists in being the first propagule that matter *m* constitutes in configuration *c*. The latter, as we noted above, muddies the picture in view of the intrinsic properties of *m*.[27]

None of the accounts discussed above, of course, were formulated with cases like ours in mind. My conclusion is merely that further development is needed before we could trust their verdicts about our cases.

7. PREDECESSOR ESSENTIALISM AND IDENTITY-RELEVANCE

For those who think the number of *m-c* predecessors which a propagule has is extrinsic to it, regardless of whether there is an otherwise successful account of intrinsic/extrinsic which clearly says so, the appropriate question is whether the number of such predecessors might be *relevant to the identity* of such a propagule. We do not need to give a formal definition of *relevant to the identity of x*; we only need to make it plausible that certain features count, so that any definition incurs an obligation either to so count them, or to explain why the appearance of plausibility is an illusion. Nor does this move weaken the case for origin essentialism: principle (1) can play the role it does in defending EBO just as well if we read the notation $x@u$ to include all the identity-relevant features x possesses at u, as well as its intrinsic features. So: are there other cases where number of predecessors, in some relevant sense, plays an important or central role in determining identity?[28]

One example is the natural numbers. If we have a conception of them according to which they have no internal structure, then what distinguishes one natural number from another is its position in the standard ordering. Position in the ordering consists just in number of predecessors. It might be objected that this case is of no relevance to ours, since the composite entities with which we are concerned differ from numbers precisely in that they *do* have internal structure, their intrinsic nature. But of course, the special feature of our crossworld identity puzzles is that intrinsic nature (along with everything else except identity) is factored out by being

26. It won't help to restrict *Y* to those values such that necessarily, any *Y* is an *X* and vice-versa. Some would say this means *Y* = *X* anyway. And it takes us quite far from the original intuition behind d-relationality.

27. There is a problem with Francescotti's account of *consists in* (p. 599), which makes it symmetric, a view perhaps associated with Hegel: a nation consists in its people, and vice-versa.

28. Excluding infinite regresses, essentialism about number of predecessors determines identity in a recycling sequence so long as we are not given two primitively different starting entities.

held constant across the entities whose identity is to be settled. The only plausible candidate for an essential property that grounds identity which is left in these cases is number of predecessors.

Salmon has suggested another example closer to home (reported in Hawthorne and Gendler 2000, p. 292). If a ship *X* evolves *à la* Ship of Theseus and a ship *Y* is built from *X*'s original matter *m* according to its plan *l*, how in the world, he asks, could one have constructed *Y* without first having *X*? Hawthorne and Gendler admit that this question has a point, but say that its force depends on thinking of *Y* as having a plan that explicitly involves building it from the discarded pieces of *X* (p. 293). But it is much more likely that the force of the question derives from the thought that if one had built just one *m-l* ship, *X* would preempt *Y* as a candidate for identity with this ship. If you are puzzled how the single *m-l* ship could be *Y* rather than *X*, it is because you are counting the property of being the first *m-l* ship as relevant to the identity of the counterfactual ship. In support of this, note that there is no comparable puzzle about how the single ship could be *X* rather than *Y*, as Hawthorne and Gendler agree: *X* could have been constructed without anything being subsequently built from its discarded parts.

But Hawthorne and Gendler suggest there are other cases where we are not inclined to count being the first *m-l* ship as relevant to identity. Suppose that actually there is no *Y*, but much later there is a *Z* which by sheer coincidence happens to be an *m-l* ship. Couldn't such a *Z* have existed by itself? Or suppose there is actually just one *m-l* ship *X*, existing at the present time. In a world with two *m-l* ships, one existing at the present time, one a thousand years ago, there is little inclination to insist that the earlier ship is *X*.

Hawthorne and Gendler are surely right about these verdicts, but the identity-irrelevance of *being the first m-l ship* is not the only possible interpretation of them. It is equally conceivable that other identity-relevant factors are at work which block default identification of the first *m-l* ship with *X*. The counterfactually-first *m-l* ships in their examples exist at times which are very distant from the period during which *X* exists. This seems to me to be no accident, for I find that the further removed in time the origination of the counterfactual ship from the origination of *X*, the weaker the claim *X* has on it. This suggests a qualification of (1) to make the sufficient condition of (1) applicable only when the item *a* in w_1 satisfying *x@u* and the item *b* in w_2 satisfying *x@v* originate close enough in time. *Close enough* is of course vague, and there are fundamentally two different ways one might accommodate the vagueness, either through counterpart theory or a vague accessibility relation. However, in the present context, what is important is that qualifying (1) in this way concedes nothing to extra-strength haecceitism. We still have a substantial

and interesting sufficiency condition for crossworld identity which, if the reasoning of section 2 is cogent, turns out to support substantial and interesting necessary conditions for crossworld identity.

8. BIAS AND THE OPEN FUTURE

Our discussion in §5 of whether *only* biological-origin-essentialism is justified by arguments of a certain type allowed the defender of EBO to use EBO to disrupt analogous arguments for deviant essentialist principles. In conclusion, I wish to discuss briefly whether this bias towards biological origin is itself justifiable. It is certainly more intuitive than the likes of EBR, but that is not a justification. Any kind of alternative to, or supplement of, EBO, will classify as essential some property an entity acquires subsequent to its coming into existence,[29] a property that can play a comparable role to biological origin in grounding identity. Such a property will be clearly accidental, if for no other reason than that *that very entity* could have ceased to exist before acquiring the property. Can we say what underlies the *that very entity*, preferably in a manner that does not rule out extra-strength haecceitism?

I suggest that our ordinary conception of the future as *open* in a way that the past is not is playing a role. One account of openness is in terms of causal influence: present events cannot cause the past to be a particular way, but they can cause the future to be a particular way. However, there is a stronger idea of openness, according to which the past is *determinate* and the future *indeterminate*. Model-theoretically, this idea of openness is captured by branching worlds (see, e.g., Thomason 1984). For it to be determinate at a time t that A will be the case, A must be the case in every future branching from t.

Consequently, if a tree T comes into existence at a time t, we would commonsensically say that it is indeterminate which branches it will grow, since in some of t's possible futures it grows *these* branches and in others, *those*. But if we adopt EBR, a deviant essentialist thesis which requires a tree T to grow the same branches in every world in which it exists, this description is incoherent. Whether or not b grows on the tree with such-and-such an origin at t is indeterminate at t, and presumably remains indeterminate until either b grows on it or the tree ceases to exist. But if trees must retain their branches across possible worlds, there is no single tree with a future that is indeterminate between growing b and not growing it: there are as many different possible trees as there are possible outcomes of the branch-growth process.

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29. An exception is the rather special case of spatio-temporal point of origin. My most recent discussion of this is in (Forbes 1999, §2). I think this special case has to be ruled out by independent considerations.

The problem with this is that we have the tree in front of us *now*, before it starts growing branches, and there is only *one* tree there.[30] It is currently indeterminate which branches will grow on the tree that is in front of us now. Therefore it is currently indeterminate which of the various possible trees it *is*. This is an indeterminacy in identity even stronger than that which is countenanced by extra-strength haecceitists, where the *Doppelgängers* of my neighbor's dog at least exist in different worlds. In the actual world, I can use *that dog* to refer to exactly one of the possible dogs, namely, the actual one. But if the future is open, then by the lights of EBR, I cannot use *that tree* (or any definite description that does not include branch-growth outcomes) to refer to a unique tree until there are no longer different possible futures distinguished by branch-growth outcomes (so determinate reference is possible only to trees in the past!). However, even extra-strength haecceitists can agree with the defenders of principles like (1) that the identity of an entity that figures in a certain course of events is not indeterminate in this way; it is not something that is fixed only after the course of events unfolds past the entity's dissolution. In the extra-strength haecceitist cases, the indistinguishable worlds with different dogs are *parallel but distinct*. This picture does not work for the combination of EBO with the open future: if there were parallel but different worlds at *t* and earlier for each different outcome of the branch-growth process, there would be no indeterminacy about how things would go for a certain tree, since each such world unfolds past *t* into streams that are the same *vis à vis* the branch-growth process for the tree in question.

Could defenders of EBR reply that this argument also betrays bias, since it is only future *contingents* that are indeterminate, and it is precisely their view that whether or not a tree grows *b* is not a contingent matter? Perhaps it is *now* determinate that *b will* grow on the tree in the same way that it is now determinate that all future samples of water will have chemical composition H_2O.

Suppose for definiteness that there are exactly two possible trees which have the same origin as a certain actual tree and are of the same biological kind, but one of these trees, *A*, grows *b*, and the other, *B*, does not. Might it be determinate at *t* and earlier times that the actual tree is *A* rather than *B*, even though nothing has occurred by *t* that requires or rules out *b*'s growing (nothing that doesn't prejudge the tree's identity)? The answer to this question has to be no, if we think the future is open in any respect. For if we ask *how* it could be determinate at *t* that the tree is *A*, before any branches grow on it, the only non-question-begging answer is that it is because the tree grows *b* at some time after *t*. But if the present can acquire determinacy in this respect from the future, why not in every other re-

30. There are ways of disputing this, but these workarounds are *costs* of the view under discussion.

spect? (Note that such backwards acquisition of determinacy is not suggested in the chemical composition case – we don't think it is now determinate that all future water will have chemical composition H_2O just because in the future, all water has chemical composition H_2O.)

A broad range of deviant essentialisms seem to be in tension with the openness of the future as we have understood it. The only essentialist principles about composite objects that sit well with it and that are consistent with (1) are principles that focus exclusively on the initial states of those objects and their ancestry. For any allusion at all to subsequent states will generate the puzzles about determinacy of identity that we have just described.[31]

Department of Philosophy
Tulane University
New Orleans, LA 70118-5698
forbes@tulane.edu

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