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PRIOR, INTERMITTENT IDENTITY AND LEIBNIZ' LAW

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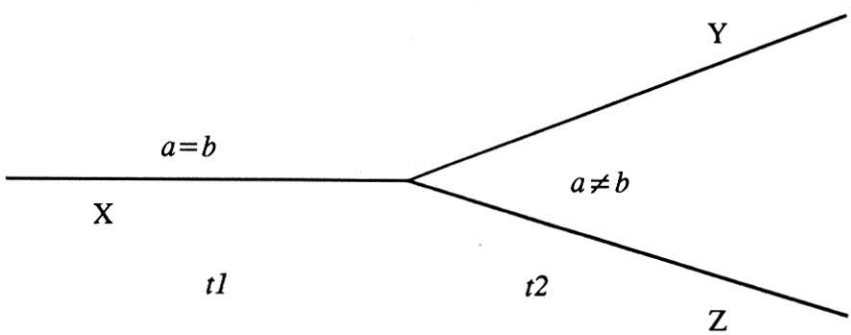
Intermittent identity is characterized by something's being sometimes, but not always, hence only intermittently, identical with something else. A case in which one object becomes two, through a process of fission, is arguably a case of intermittent identity. Imagine that X undergoes fission at time 1 and splits into two individuals, Y and Z. Before time 1, Y and Z are identical but, after time 1, Y and Z are not identical. So, Y and Z are intermittently identical. This also requires that, roughly speaking, Y is identical with X and that Z is identical with X. (Why this is only roughly speaking the case will be explained below.) As many have pointed out, this way of describing the case threatens the alleged transitivity of identity. If the description is correct, then we cannot reason from 'Y is identical with X' and 'Z is identical with X' to 'Y is identical with Z'. And if we cannot do this, then it is a simple matter to construct an argument which shows that intermittent identity is not consistent with Leibniz' Law. The usual response has been to accept that intermittent identity is not possible. However, A. N. Prior was prepared instead to give up Leibniz' Law: he thought that the intermittent identity thesis provides the best description of the fission case.([1]) Like Prior, I think that the intermittent identity thesis provides a plausible description of the fission case. Unlike Prior, I do not think that intermittent identity is inconsistent with Leibniz' Law.

Consider first Prior's argument for the inconsistency. It is helpful to do this in the context of a diagrammatic representation of the fission case.



Prior's argument for the inconsistency runs along the following lines:

1. *a* is identical with *b*.	*ex hyp*
2. *a* has the property 'is identical with *a* at *t2*'.	*ex hyp*
3. Leibniz' Law.	Assumption
4. *b* has the property 'is identical with *a* at *t2*'	1, 2, 3
5. *b* has the property 'is non-identical with *a* at *t2*'.	*ex hyp*
6. ~ Leibniz' Law.	3-5, *Reductio*

(This formulation of the argument will have to be revised presently but will serve to demonstrate the force of Prior's argument in a comparatively uncomplicated way.)

Now 1 is in some sense true. 2 and 5 are assumptions apparently consonant with the intermittent identity thesis. 4 seems to follow from 1 and 2 by Leibniz' Law. However 4 seems inconsistent with 5. Certainly the inconsistency could be avoided by rejecting Leibniz' Law. This would eliminate 4. Alternatively, we could try to show that 2 or 5 is not, despite initial appearances, an assumption sanctioned by the intermittent identity thesis. I shall try to show that 5 is not thus sanctioned. This requires a recasting of the Prior argument with more careful attention to temporal indexing.

First consider 1, which tells us that *a* is identical with *b*. This is, roughly speaking, true, but it is also misleading. What is strictly true and not misleading is that *a* and *b* are identical at *t1*. 2 tells us that *a* at *t1* has the property of being identical with *a* at *t2*. Next, 4 tells us that *b* at *t1* has the property of being identical with *a* at *t2*. Finally, 5 tells us that *b* at *t1* has the property of being non-identical with *a* at *t2*. So, we might rewrite 1, 2, 4 and 5 as:

1*. *a* at *t1* has the property 'is identical with *b* at *t1*'.	*ex hyp*
2*. *a* at *t1* has the property 'is identical with *a* at *t2*'.	*ex hyp*
3*. Leibniz' Law.	assumption
4*. *b* at *t1* has the property 'is identical with *a* at *t2*'.	1*, 2*, 3*
5*. *b* at *t1* has the property 'is non-identical with *a* at *t2*'.	*ex hyp*
6*. ~ Leibniz' Law.	3*-5*, *Reductio*

It is useful to add:

7*. *b* at *t2* has the property 'is non-identical with *a* at *t2*.'

How is this temporal indexing to be read? 1* says that *a* at *t1* is identical with *b* at *t1*; that at *t1* *a* and *b* are the same thing. This to be distinguished from the claim that at *t1* *a* is identical with *b* at *t1*. This latter claim says that it is true at *t1*, and presumably because it is timelessly true, that *a* has the property of being identical with *b* at *t1*. Given 1*, what is timelessly true is that *a* at *t1* has the property of being identical with *b* at *t1*. This is true at *t1*, true at *t2* and true at all times.

To construe the fission case according to the intermittent identity thesis is to say that after the fission there are two objects which before the fission were identical. After the fission *a* and *b* are no longer identical, although before the fission they were. On this view *a* at *t1* and *a* at *t2* are not temporal parts standing in some temporal unity relation: rather they are the very same object. This might be put by saying they are the same persisting object. Nor does any new object come into existence at the point of fission. Both fission products were around prior to fission and they were identical. After the fission they are not identical. So, how many persisting objects are there in the fission scenario? There are two. These two are identical before the fission but non-identical after. There is, before the fission, a persisting object which is the same persisting object as each of the post-fission objects and the post-fission objects are not the same persisting object. Fission is a case of one persisting object becoming two, not by the earlier object ceasing to exist and two new objects coming into existence, but by two objects which were earlier identical ceasing to be identical and therefore becoming two.

It is perhaps useful to compare the construal of fission on the intermittent identity thesis with its construal on an alternative view. It might be urged that *a* at *t1*, *b* at *t2* and *a* at *t2* are temporal parts out of which are composed two objects which share a temporal part, namely *a* at *t1*. This construal does not threaten Leibniz' Law because what unifies the temporal parts is not identity. What unifies them is a temporal unity relation, distinct from identity, which has its basis in a continuity relationship between the fission products and the fission source. Now the intermittent identity construal has a similar structure, except that it denies that *a* at *t1* and so on are temporal parts and that the unifying relationship is other than identity. It claims that *a* at *t1* and so on are persisting objects and that they are related by identity: specifically, *a* at *t1* and *b* at *t1* are the same persisting object, *a* at *t1* and *a* at *t2* are the same persisting object and *a* at *t1* and *b* at *t2* are the same persisting object. What this construal denies is that *a* at *t2* and *b* at *t2* are identical: it denies that they are the same persisting object. This

may seem strange but this in itself is insufficient reason to dismiss intermittent identity. It does provide a way of construing fission and, provided it does not conflict with Leibniz' Law, it should be taken seriously.

So to return to the recast argument, my claim is that while 1*, 2*, and 4* are true, 5* is false. 5* says that, *b* at *t1* has the property of being non-identical with *a* at *t2*. This is false: *b* at *t1* is identical with *a* at *t1* and *a* t *t1* is identical with *a* at *t2*. It is at *t2* that *b* is non-identical with *a* at *t2*: that is where they happen to be intermittently non-identical. However, at *t2* *a* is identical with *b* at *t1*: this is because *a* and *b* are intermittently identical and happen to be identical at *t1*. It is also true of *a*, at *t2*, that it is identical with something, namely *a*, which is, at *t1*, identical with *b* at *t2*. Likewise it is true of *b*, at *t2*, that it is identical with something, namely *b*, which is, at *t1*, identical with *a* at *t2*. So, what we may assume, consonant with the intermittent identity thesis, is 7*. Once the offending 5* is removed, the assumption of Leibniz' Law in conjunction with the intermittent identity thesis does not produce an inconsistency.

There is an argument which threatens this reconciliation. Recall that if we assume, as we have, that identity-with-x is a property, then Leibniz' Law entails transitivity of identity. So, if *a* has the property 'is identical with *c*' and if *a* is identical with *b*, then *b* has the property 'is identical with *c*.'

This assumption drove the argument for the inconsistency of Leibniz' Law with intermittent identity. We might think that if the attempted reconciliation threatens the transitivity of identity, then it has failed. Recall that it is claimed of *b* at *t2* that it is identical with *b* at *t1*; it is claimed of *b* at *t1* that it is identical with *a* at *t2*; but it is denied that *b* at *t2* is identical with *a* at *t2*. However, it might be argued that, given the transitivity of identity, *b* at *t2* must be identical with *a* at *t2*.

Certainly if the intermittent identity thesis is true, then transitivity inferences concerning trans-temporal identity will be invalid. They will be invalid because the intermittent identity thesis just is the thesis that one object may become two and that the original is identical with each of the fission products which are not themselves identical with each other. Such inferences are invalid because they are insensitive to the temporal indexing of identity claims which the intermittent identity thesis requires. To assume that they are valid and to argue from that against the thesis is question-begging. Moreover, the intermittent identity thesis does permit transitivity inferences involving identity claims concerning temporally indexed items, namely in cases where the temporal indices are the same. If *b* at *t1* is identical with *a* t *t1* and *a* at *t1* is identical with *c* at *t1*, then *b* at *t1* is identical with *c* at

t1. (Many invalid trans-temporal transitivity inferences, that is those without the appropriate indexing, produce true conclusions. The conclusions turn out true because intermittent identity is comparatively rare.)

There is a further objection to the possibility of intermittent identity which warrants some mention here. It is thought by some, notably Saul Kripke, that identity statements involving rigid designators are, if true, necessarily true.(2) It might also be thought that the device of temporally indexing identity statements would mean that identity statements could change their truth value, which is to say that, *contra* Kripke, they are contingently true. However, it is possible to develop a reply to this similar to the one developed in response to the transitivity objection. Temporally indexed identity statements will not change their truth values. Moreover, this will be so where the values of the indices differ. Again this is what we would expect if the intermittent identity thesis is true. Pointing out that the truth values of unindexed identity statements change is not in itself an argument against the intermittent identity thesis: indeed it is the core assertion of the thesis. We need to be told just why what it offers is defective or deficient. To appeal to the Kripkean intuition that one thing cannot become two begs the question against the intermittent identity thesis. It is the coherence of the thesis which must be challenged and this has not been done. The Leibniz' Law argument attempted this but failed.

The argument against intermittent identity via the alleged impossibility of contingent identity can be given a different twist. It would seem that intermittent identity is related to contingent identity in the following way. Contingent identity requires that there is a possible world W which contains two objects which are not identical in W and that there is some other possible world W* in which these objects are identical. Intermittent identity is the intra-world analogue of contingent identity. In the former case, two objects identical at one world are non-identical at some other. In the latter case, two objects identical at one time are non-identical at another. So, it might be argued that if contingent identity is impossible, then so is intermittent identity. (Equally plausibly contingent identity is possible only if intermittent identity is possible. So, an argument for intermittent identity is an argument for contingent identity.) However, the question of whether contingent identity is possible is at least controversial.(3) Here I shall simply refer to recent work which I believe shows this to be so and acknowledge that I am happy to tie the fate of intermittent identity to contingent identity.(4)

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NOTES

(1) See A. N. Prior, 'Time, Existence and Identity', *Proceedings of the Aristotelian Society*, 66 (1966), 183-192. also of some relevance is 'Opposite Number', *Review of Metaphysics*, 11 (1957), 196-201.

(2) Saul Kripke, 'Naming and Necessity' in D. Davidson and G. Harman, eds, *The Semantics of Natural Languages*, Dordrecht, Reidel, 1972, 306-8.

(3) See A.N. Gallois, 'Rigid Designation and the Contingency of Identity', *Mind*, XCV, 377 (1986), 56-75; W.R. Carter , 'Contingent Identity and Rigid Designation', *Mind*, XCVI, 382, (1987), 250-5; A.N. Gallois, 'Carter on Rigid Designation and Contingent Identity', *Mind*, XCVII, 386 (1988), 271-78.

(4) Thanks to Fred D'Agostino, Andre Gallois and David Londey for comments.