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Delayed Fission and the Standard Psychological View of Personal Identity

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ABSTRACT: Consider a specific type of fission where psychological continuity takes a branching form, and one of the offshoots comes into being later than the other offshoot. Let us say that the earlier offshoot comes into being in the left branch at t, and the later offshoot comes into being in the right branch at t+1. With regard to the question how many persons are involved in this case, three answers are worth considering: (i) The original subject persists up to t; a distinct person comes into being immediately after t and continues to exist in the left branch; and the third person comes into being in the right branch at t+1. (ii) The original subject persists up to the moment immediately before t+1; a distinct person comes into being at t+1 and continues to exist in the left branch; and the third person comes into being in the right branch at t+1. (iii) The original subject continues to exist in the left branch; a distinct person comes into being in the right branch at t+1. For those who hold that personal identity consists in psychological continuity of some sort, the aforementioned three options exhaust the sensible ways of understanding how one persists in delayed fission. However, I argue that complications arise for each answer. Hence, delayed fission poses a challenge for the psychological approach to personal identity.

KEYWORDS: Delayed fission – fission – persistence condition – personal identity – psychological approach to personal identity.

In this article, I will argue that there is an intractable problem for the mainstream position in the psychological approach to personal identity,

which I shall dub *the standard psychological view of personal identity* (or the standard psychological view, for short). This problem involves a specific type of fission where one of the offshoots comes into being later than the other offshoot. Call this type of fission *delayed fission*. My contention is that no version of the standard psychological view can plausibly explain the persistence condition of delayed fission victims.

1. The standard psychological view and delayed fission

Before introducing the problem, I need to be clear about the intended target of this article. The standard psychological view has probably received the most thorough examinations by Derek Parfit (1971 and 1984) and Sydney Shoemaker (1970 and 1984), and has also been discussed by a great number of philosophers afterward.[1] Like other versions of the psychological approach to personal identity, the standard psychological view holds that a person existing at one time and a person existing at another time are identical to each other by virtue of maintaining psychological continuity of some sort, where psychological continuity consists in overlapping chains of strong psychological connectedness. A person existing at one time is strongly psychologically connected to a person existing at a different time just in case there exist a sufficient number of relevant psychological connections holding between them,[2] such as memories, the continuation of beliefs, desires, intentions, and other suitable psychological states/capacities and characteristics, underpinned by the right kind of

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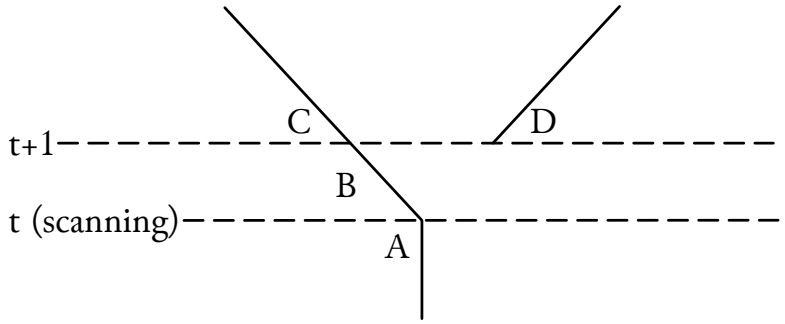
[1] For more recent discussions of the standard psychological view, see Brueckner (1993; 2005), Campbell (2001; 2005), and Noonan (2006).

[2] Here I follow Parfit's explication of the notions of strong psychological connectedness and psychological connections (see Parfit 1984, 205-206). Parfit suggests a rather casual view regarding what counts as a sufficient number of psychological connections for maintaining psychological continuity. He proposes that there are a sufficient number of psychological connections holding from one day to the next if their number is "*at least half* the number that hold, over every day, in the lives of nearly every actual person" (Parfit 1984, 206). Since it is not necessary to specify the correct criterion of what counts as a sufficient number of psychological connections for the purpose of this article, I will simply assume that there is a plausible criterion for determining such a number.

cause.[3] The standard psychological view also holds that in a case of regular fission where two offshoots diverge at the same time, the pre-fission subject is numerically distinct from either of the two post-fission offshoots, and thus that three persons are involved in total. In this respect, this view is different from the one developed by David Lewis (1976) and other perdurantists, which claims that a regular fission case involves two distinct continuants partially overlapping each other before the fission. The standard psychological view does not allow overlaps at any time before or during the fission. In short, the standard psychological view holds that (i) personal identity consists in non-branching psychological continuity, and thus that (ii) in a regular fission case, one ceases to exist and is replaced by two distinct individuals.

Bearing in mind the aforementioned key tenets of the standard psychological view, I will now turn to the problem posed by delayed fission. Imagine a case where one's body is scanned and continues to exist, and *after some time*, a new human body is generated at a different place exactly in accordance with the scanned information. Assuming that the scanning and duplication process is successful, the person occupying the new body is psychologically exactly similar to the original person as he is at the time of the scanning. Call this case *Delayed Replication*, as diagramed below:[4]



Mathematically speaking, a total of eight possibilities can be suggested with regard to the identities among A, B, and C:

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[3] Regarding the causal basis of psychological connections, Parfit thinks that the right kind of cause is any cause, as opposed to the normal cause (which requires the continued existence of the same brain) or any reliable cause (cf. Parfit 1984, 208-209). I will follow Parfit's view on the right kind of cause in this article, although most of my arguments will work with other views as well.

[4] As the diagram suggests, A is the continuant person persisting up to t; B is the continuant person persisting between t and t+1 (exclusive—i.e., not including t or t+1); C and D are the continuant persons persisting at and after t+1 in the left branch and in the right branch, respectively.

(1) A≠B, B≠C, and A≠C
(2) A≠B, B≠C, and A=C
(3) A≠B, B=C, and A≠C [*the First Route*]
(4) A≠B, B=C, and A=C
(5) A=B, B≠C, and A≠C [*the Second Route*]
(6) A=B, B≠C, and A=C
(7) A=B, B=C, and A≠C
(8) A=B, B=C, and A=C [*the Third Route*]

It is clear that (4), (6), and (7) cannot be the case because they all lead to contradiction. As for (1) and (2), neither is inconsistent; however, I do not think that (1) and (2) are worth much consideration because they are less plausible than (3), and as I shall argue later, (3) is problematic.[5] This leaves us (3), (5), and (8) as the least untenable of all the options. I shall call them, respectively, the First Route, the Second Route, and the Third Route. Confronted with delayed fission, advocates of the standard psychological view must choose one of the three routes, since the aforementioned three routes exhaust all the sensible options. In what follows, however, I will argue that given that our persistence condition is psychological in nature, each of them yields deeply implausible implications.

2. Problems with the First Route

The First Route holds that A is not identical to B, although B is identical to C. So, on this alternative, A ceases to exist immediately after t, and a new person comes into being from that time on (in the left branch). If this is true, then we will have to conclude that a mere scanning process can

[5] More specifically, I claim that (1) and (2) are less plausible than (3) because they have all the disadvantages of (3) that I will specify in the following section on the First Route, while they have no particular advantages over (3). (1) and (2) also share some disadvantages of (5) that are discussed in the section on the Second Route, which are not shared by (3). See footnotes 9 and 10. In arguing this way, I assume that we are continuant beings that persist for some time. Those who believe that we are ephemeral time-slice of continuant persons (see, e.g., Sider 1996; 2001, 188-208) or that the enduring self is an illusion (see, e.g., Hume 2000, Book 1, Part 4, Sec. 6) may challenge this assumption. However, I will not discuss these views here because that would take us beyond the scope of this article.

terminate one's existence without disturbing his memories, beliefs, intentions, and any other psychological features. That is very hard to believe.

A possible defense of the First Route may resort to the distinction that Parfit draws between personal identity and what matters in survival. Parfit famously argued that what matters in survival is the preservation of psychological continuity, not personal identity *per se* (cf. Parfit 1984, 253-261). According to him, for example, what I ought to be concerned about in facing life-threatening incidents such as an imminent battle is not whether I will still exist after the incident but whether there will be someone psychologically continuous with me as I am now before the incident. Employing this idea, proponents of the First Route may argue that as long as what matters to A is preserved in B, it is immaterial whether A is identical to B or not, and therefore it is not so implausible to claim that A is not identical to B in Delayed Replication.

This response does not strike me as tenable. Even if we grant that there is a conceptual difference between personal identity and what matters in survival, and that the former, unlike the latter, carries no prudential value, this does not imply that personal identity may hold in an unprincipled way. For instance, if a theory claims for no good reason that I will suddenly cease to exist as soon as I step out of this room, though, of course, what matters to me before I go out is preserved in the person who will be just outside the room, this theory ought to be deemed implausible. Parfit has a principled answer as to the holding of personal identity: he thinks that personal identity is constituted by psychological continuity that does not take a "branching" form.[6] In Delayed Replication, the psychological continuity holding between A and B does not take a branching form. So, on Parfit's view, it ought to be the case that A=B, contra the First Route. Those who argue for the First Route still need to provide a principled answer to the question why one ceases to exist while going through the scanning process in Delayed Replication.

Proponents of the First Route may try to explain away the implausibility just noted by considering a different type of delayed fission—one involving a brain transplant, as opposed to a bodily scanning process. Imagine a case where one's psychological capacities and contents are not lateralized

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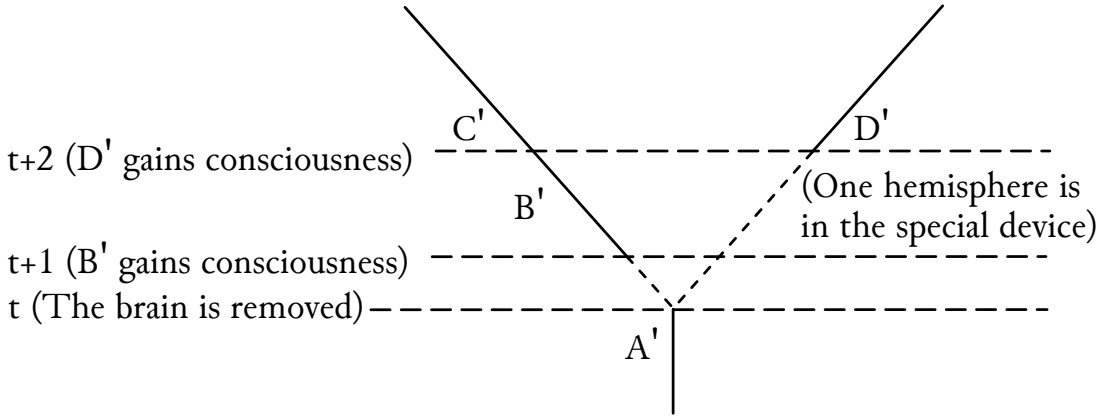
[6] Some have argued that it is impossible, or at least extremely difficult, to formally define the non-branching clause in a non-circular manner (see, e.g., Brueckner 2005; Brueckner – Buford 2008). In my (2010) article, I proffer three formulations of the non-branching clause that do not involve a circular reasoning.

in the brain; his two brain hemispheres have more or less the same capacities, and they are mutually completely redundant in their psychological contents because they share most of the contents through the corpus callosum; as a result, they are almost symmetrical with respect to their psychological states/capacities, psycho-physical characteristics, etc. Suppose also that the two hemispheres are removed from the original subject's cranium, and the right hemisphere is preserved in a special device where it remains biologically functional but unconscious; it will gain consciousness once transplanted to a living human body. The left hemisphere, while in an unconscious state, is transplanted to a brainless, living human body, and a few days later the right hemisphere is similarly transplanted to a distinct living human body.[7] Since the two brain hemispheres are quite similar to each other, each of the two resulting persons, as soon as he gains consciousness, is strongly psychologically connected to the original person before the transplant operation to almost the same degree. Call this case Delayed Division, as diagramed below:



[7] Some may doubt whether this case is really an example of delayed fission on the grounds that the unconscious right hemisphere may be like a brain in hibernation. On this view, there exists a person kept in existence by the right hemisphere while it is in the device, and that person is like an ordinary person in a state of dreamless sleep. Those who think this way may adapt the story as they see fit so that the adapted story is clearly a case of delayed fission. For example, one might stipulate that the right hemisphere, after removal, is to be divided into many pieces, carefully preserved in separate places without irreparable damage, and later reassembled exactly as they were before the surgery. I leave it open what the best adaptation of the story will look like. The point that I make in what follows does not hinge on the particular details of the story, but rather on its structural features. For simplicity's sake, I will assume that my previous description involving the removal and preservation of one hemisphere provides a case of delayed fission.

(The dashed line on the left-hand side between t and t+1 indicates the time during which the transplantation of the left hemisphere is performed. The dashed line on the right-hand side between t and t+2 indicates the time during which the right hemisphere is preserved in the special device.)

Since Delayed Division is structurally quite similar to Delayed Replication, proponents of the First Route, to be consistent, must hold that A'≠B'. This implies that A' ceases to exist as soon as his brain is removed at t. Since the end of A' 's existence involves a rather dramatic turn of events – i.e., the removal of the brain resulting in complete loss of consciousness – a proponent of the First Route might argue that this implication is at least not as absurd as what the First Route implies about Delayed Replication: namely, that one ceases to exist as soon as his body goes through the scanning process.

However, I do not see much advantage in this maneuver because it seems to me that to hold that A'≠B' in Delayed Division is no more plausible than to hold that A≠B in Delayed Replication. To see this point, imagine that one undergoes a surgery where the surgeons remove one's right hemisphere and preserve it in a special device as described in Delayed Division. (Again, as in Delayed Division, suppose that the two hemispheres are psychologically quite similar to each other with respect to their psychological states/capacities, psycho-physical characteristics, etc.) The removed hemisphere maintains the ability to regain consciousness; but let it be stipulated that, as a matter of fact, the surgeons will never transplant the right hemisphere to a brainless living body.[8] Meanwhile, the subject's left hemisphere remains intact and fully functional in the original body, maintaining psychological continuity with the subject before the removal of the right hemisphere. Call this case *Half-brain Removal* (see the Appendix for the diagram). I think it would be surprising if anyone denies that the subject survives the surgery in Half-brain Removal. After all, in many actual cases where a considerable amount of a patient's cerebrum is removed, people do not seem to doubt that the patient survives the surgery.

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[8] Here again, I assume that there is no person kept in (or brought into) existence by the right hemisphere while it is in the device. Those who think otherwise should revise the case as they see fit so that the brain material constituting the right hemisphere in the revised case, while restorable to a biologically functional state, fails to give rise to the existence of a person.

Now, imagine a story exactly like Half-brain Removal except that one's entire cerebrum is removed, and only the left hemisphere is transplanted to a brainless, living human body. The right hemisphere is to be kept permanently in the device. Call this case *Half-brain Transfer* (see the Appendix for the diagram). The only difference between Half-brain Removal and Half-brain Transfer is that the left hemisphere remains in the original body in the former case, but not in the latter case. According to the psychological criterion of personal identity, however, there should be no significant difference between the two cases. This is because, in either case, perfect psychological continuity is preserved between the original subject and the possessor of the left hemisphere after the surgery. Therefore, advocates of the standard psychological view should hold that if the subject in Half-brain Removal survives the surgery, then the subject in Half-brain Transfer survives as well.

But what happens in Half-brain Transfer is structurally exactly similar to what happens in Delayed Division up to the moment just short of t+2. Hence, if the subject in Half-brain Transfer survives the surgery, then we should conclude that the original subject in Delayed Division – i.e., A' – continues to exist up to the moment just short of t+2. This entails that A'=B', contra the First Route.

We can recapitulate the preceding argument as follows:

PR1: The subject in Half-brain Removal survives the surgery.
PR2: If the subject in Half-brain Removal survives the surgery, then the subject in Half-brain Transfer survives the surgery.
PR3: If the subject in Half-brain Transfer survives the surgery, then A'=B' in Delayed Division.
C: A'=B' in Delayed Division.

Setting aside differences in minor details among the three cases (Half-brain Removal, Half-brain Transfer, and Delayed Division until just before t+2) as insignificant, advocates of the First Route must grant PR2 and PR3. The only way to resist the argument then is to deny PR1. But that would be tantamount to saying that the removal of half of one's brain matter terminates one's existence. From the perspective of the standard psychological view, this ought to sound as implausible as saying that a mere scanning process can terminate one's existence (given that the recipient of the left hemisphere in the Delayed Replication is strongly psychologically connected to the original person before the surgery.) One problem with the

First Route then is that it implies that a mere scanning of one's body or the removal and preservation of half of one's brain terminates one's existence.

Apart from the preceding observation, the First Route faces an even more serious problem: given the truth of the First Route, whether one survives the scanning of one's body or the transfer of one's half-brain depends on what will happen to someone else *in the future*. To illustrate this problem, consider a case exactly like Half-brain Transfer except that it has *not* yet been determined whether the surgeons will perform the operation of transplanting the right hemisphere—either they will permanently leave it in the device or they will transplant it into a living, brainless human body after a while. Call this case *Indeterminate Division* (see the appendix for the diagram). Suppose that I am the recipient of the left hemisphere shortly after the surgery. Having just gained consciousness, I seem to remember the experiences and memories of the original person before the surgery. Naturally, this leads me to believe that I have existed for a long time before the surgery. Would I be right? According to the First Route, whether I am right in holding this belief depends on what will happen to the right hemisphere in the future. If it is somehow destroyed before the surgeons perform the further surgery or if the surgeons end up not performing a further operation, then the situation would be structurally similar to Half-brain Transfer. Hence, advocates of the First Route should conclude that the person who underwent the initial surgery has survived it, which entails that I have existed before the surgery. On the other hand, if the surgeons decide to perform the surgery, and end up successfully performing the operation of transplanting the right hemisphere to a different recipient body, thereby bringing a person into existence, then the situation would be structurally similar to Delayed Division. In that case, since the First Route holds that $A' \neq B'$ in Delayed Division, proponents of the First Route should also conclude that it *turns out* that I have not existed before the initial surgery. Hence, according to the First Route, whether in Indeterminate Division I have or have not existed *in the past* before the initial surgery depends on whether there will be a recipient of the right hemisphere *in the future*. Many would find this result implausible. Suppose I, having gained consciousness after the surgery, ask myself whether I am the same person as the one who was anxious about the surgery. If the aforementioned result is correct, then I should answer, "I don't know *yet*. To answer this question, I will have to wait and see whether the right hemisphere of the original

subject will be successfully transplanted to a different human body." The absurdity of this remark seems to me to be a sufficient reason to reject the First Route.[9]

3. Problems with the Second Route

The Second Route specifies that A=B and B≠C in Delayed Replication. This implies that A (=B) continues to exist until immediately before t+1, but ceases to exist as soon as his "replica" (=D) comes into being in the right branch at t+1. To illustrate the implausibility of this implication, imagine that you are B in Delayed Replication shortly before t+1. Your body was scanned a while ago (at t), and based on the information from the scanning process, someone other than you is now about to come into existence someplace else. Suppose you are not aware of these facts (perhaps you were not even informed why your body was scanned). Now, imagine that, at the very moment your "replica" comes into being, you were in the middle of uttering a sentence in a discussion with your friend. If B≠C as specified in the Second Route, we will have to conclude that you have never completed the sentence you were uttering, because you would have ceased to exist before the sentence was fully uttered. The person who completed the sentence would *not* be you. This is strikingly implausible. Your friend would not believe that her conversation partner has *just* been replaced with a different person who is bodily continuous with you (and thus looks just like you), and is psychologically continuous with you (and thus talks and thinks just like you), but who is not aware that (s)he has just come into existence. That being who completed the sentence certainly would not believe that (s)he has just come into existence with all those quasi-memories, quasi-beliefs, and quasi-intentions that seem to have been his/her own for a long time. In sum, it is hard to accept that the coming-to-be of *someone else* terminates your existence. This problem has to do with the violation of what is known as *the only x and y principle* in the literature on personal identity. This principle states that whether or not *x* is identical to *y* must

[9] Note that the problems with the First Route that I specify in this section stem from the fact that it holds that A≠B in Delayed Replication. Since (1) and (2) in the previous section also hold that A≠B, they are susceptible to these problems as well. This observation partially justifies my previous claim that (1) and (2) are less plausible than the First Route; cf. footnote 10.

depend only on the intrinsic features of the relation between them; it cannot depend on a fact about any individual other than *x* and *y* (see Noonan 2003, 129; Wiggins 1980, 96). Against the initial plausibility of this principle, if B≠C as specified in the Second Route, then your continued existence depends on whether or not "your replica" comes into being somewhere else.[10]

Proponents of the Second Route may respond by arguing that the standard psychological view maintains that personal identity obtains only in the absence of a concurrent competitor that is also psychologically continuous with the original subject, and that C as he is at t+1 is psychologically continuous with A as he is at t. The standard psychological view has it that both of the two offshoots in *regular fission* are not identical with the original subject because they are in competition: due to both offshoots being psychologically continuous with the original subject, they have an equal claim to be the same person as the original subject. Personal identity is preserved only when there is no concurrent competitor. In Delayed Replication, the argument goes, B has no concurrent competitor, and is psychologically continuous with A. Hence, the standard psychological view ought to claim that A=B. On the other hand, C and D are in competition. Therefore, the standard psychological view should hold that A (=B) is not identical with either C or D. This is what is implied by the Second Route.

I do not find this argument convincing. For argument's sake, let us grant the defenders of the Second Route that A=B in Delayed Replication (and let us refer to either A or B indiscriminately as the pre-fission subject). Nevertheless, it is questionable that C and D are in competition to be the same as the pre-fission subject as specified in the preceding argument, for it is doubtable that the relations C and D bear to the pre-fission subject are analogous to those that the two offshoots bear to the original subject in regular fission. This is because D as he is at t+1, unlike C as he is at t+1, is not psychologically connected to B as he is immediately before t+1, given that psychological connections must be underpinned by *some* sort of causal basis. The psychological states of D as he is at t+1 may be qualitatively

[10] Note that the problem that I specify in this paragraph is due to the fact that the Second Route holds that B≠C in Delayed Replication. Since (1) and (2) also hold that B≠C, they are susceptible to this problem as well. On the other hand, the First Route is not vulnerable to this problem, since it holds that B=C in Delayed Replication. This is another partial basis for holding that the First Route is more sustainable than (1) or (2); cf. footnote 9.

quite similar to the psychological states of B as he is immediately before t+1. However, the psychological states of the former are not causally related to those of the latter. By contrast, the psychological states of C as he is at t+1 are immediately caused by the psychological states of B as he is immediately before t+1, just like the way in which the psychological states of the two offshoots in regular fission as they are immediately after the fission are caused by the psychological states of the pre-fission subject as he is at the moment of fission. Consequently, C as he is at t+1 and D as he is at t+1 do not stand in the same relations to B as he is immediately before t+1. Unlike the two offshoots in regular fission, C and D in Delayed Replication do not have an equal claim to be the same person as the pre-fission subject. The preceding argument is mistaken in claiming that D is a legitimate competitor of C in Delayed Replication.

There is a further problem for the Second Route. Since B and D are neither psychologically nor bodily continuous with each other,[11] we can plausibly assume that they are two distinct persons. Then, since the Second Route holds that A=B in Delayed Replication, it follows that A≠D. So, the Second Route yields the result that A as he is at t is identical to B as he is immediately after t, and that A as he is at t is not identical to D as he is at t+1. However, this result does not accord well with the standard psychological view. With respect to their psychology, B as he is immediately after t and D as he is at t+1 are exactly alike, and their psychological states are causally related to the psychological states of A as he is at t in exactly similar way. How is it then that only B as he is immediately after t, but not D as he is at t+1, is identical to A as he is at t? If the only relevant determinant of personal identity is psychological in nature as the standard psychological view maintains, and B as he is immediately after t and D as he is at t+1 do not differ in their internal psychology as well as in the psychological relations they stand to A as he is at t, then proponents of the Second Route owe us an explanation as to why it is that A as he is at t is identical to B as he is immediately after t, but not to D as he is at t+1.

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[11] B and D are not psychologically continuous with each other because the psychological states of B as he is immediately before t+1 and the psychological states of D as he is at t+1 are not causally related to each other. In addition, if the temporal distance between t and t+1 is long enough, B as he is immediately before t+1 and D as he is at t+1 will tend to be psychologically dissimilar.

4. Problems with the Third Route

The results of the preceding discussion leave us with the Third Route. But there are problems for the Third Route as well. Suppose that in Delayed Replication, A, B, and C are all identical with one another as specified in (8). Then, advocates of the Third Route should commit to one of the following alternatives regarding the identity of A and D:

(8a) A=B, B=C, A=C, and A=D;
(8b) A=B, B=C, A=C, and A≠D.

Here neither alternative is plausible. First, (8a) is not tenable, because it entails that C=D, which seems plainly false.[12] In addition, (8b) is implausible as well, since the story of Delayed Replication can be revised in such a way that it will be hard to explain how A=C and A≠D at the same time. Suppose that the interval between t and t+1 is very short—say, a mere few seconds. That is, suppose that D comes into being only a few seconds after the scanning of A's body. Then, the internal psychology of C as he is at t+1 would be almost the same as that of D as he is at t+1, because both of them would be psychologically connected to the psychological states of A as he is at t to almost the same degree. Then, why is it that A is identical to C but not to D? Perhaps one may answer that this is because C, but not D, has the right kind of causal basis connecting his psychology with A. This response seems to suggest that the right kind of causal basis involves the continuation of the same body, since C, but not D, is bodily continuous with A, and that seems to be the only notable difference between C and D as regards their relations with A. Then, this answer suggests that personal identity consists at least in part in bodily continuity. However, if an analysis implies that one person X is identical to some person Y but not to another person Z that is (almost) psychologically indistinguishable to Y

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[12] Parfit presents some striking examples regarding the implausibility of this result. For instance, (8a) implies that if C and D play tennis together, we ought to describe the situation by saying that one single person is playing tennis by himself, while mistakenly believing in each half of his divided mind that he is playing it with someone else. See Parfit (1984, 256-257). Ontological monists may grant that C=D on the grounds that *everything* that exists is one and the same. I will not discuss the monistic view here because that would be beyond the scope of this article. Instead, I will simply assume (as most, if not all, defenders of the standard psychological view seem to do) that there exist a number of distinct persons in the universe.

only on the grounds that Y, but not Z, is bodily continuous with X, I think the standard psychological view should reject the analysis. It just sounds like too much departure from a psychological approach of *any* stripe.[13]

At this point, it may be worth noting that the Third Route is also susceptible to the second problem posed for the Second Route. Given that B≠D in Delayed Replication, proponents of the Third Route should hold that A=B and A≠D. Then, they should provide a plausible explanation why A is identical to B but not to D, despite the fact that B as he is immediately after t and D as he is at t+1 are psychologically exactly alike and they are psychologically connected to A as he is at t in exactly similar way.

Finally, one can argue that the Third Route renders the identity condition of a person completely arbitrary. To see this point, imagine a case similar to Delayed Division except that D' comes into being only a few seconds (as opposed to a few days) after B' does. Call this case *Seconds-delayed Division* (see the Appendix for the diagram). The diagram of Seconds-delayed Division should be structurally identical to that of Delayed Division. So, I will reuse the diagram of Delayed Division in referring to the subjects of Seconds-delayed Division. (Only, in considering Seconds-delayed Division, the interval between t+1 and t+2 should be regarded as just a few seconds.)

Note that, if the surgical procedure of transplanting two brain hemispheres to distinct living human bodies becomes technologically available, and surgeons actually perform such a surgery, then most actual transplant cases will be instances of something like Seconds-delayed Division. This is because it is highly likely that the two resulting persons will not gain consciousness at exactly the same time. Even if the surgeons are extremely

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[13] Note that a different problem arises for the proponent of the Third Route in regard to delayed fission involving the transfer of one hemisphere of the brain to the debrained cranium of a live human body, the requisite delay occurring during the process of disconnecting and reconnecting the hemisphere-in-transfer (such as Delayed Division or Half-brain Transfer). In this type of delayed fission each of C' and D' is psychologically connected to A' by virtue of having one half of A' 's brain, and retaining the same functioning brain – or a sizeable portion thereof – is a natural candidate for being the right kind of causal basis, the rest of the body being irrelevant for the maintenance of psychological continuity. Such delayed fission cases would work against the proponent of the Third Route who holds that C', but not D', is identical with A'. For it would be arbitrary to favor C' 's claim to being identical with A' and not D' 's, given that both C' and D' have enough number of psychological connections to A' sustained by the same kinds of causal bases (i.e., retaining a sizable functioning portion of A' 's brain).

careful to transplant each hemisphere simultaneously, one of the hemispheres will probably gain consciousness somewhat earlier than the other, depending on environmental variables such as the metabolic conditions of the recipient bodies. If the two hemispheres gain consciousness at an interval of a few seconds, then, assuming that each offshoot comes into being when they gain consciousness, the situation would be Seconds-delayed Division.

With this in mind, compare Seconds-delayed Division with an instance of *regular* fission, where the two hemispheres of the original subject are transplanted to two distinct human bodies and the two offshoots come into being *at exactly the same time* (call this case, plainly, *Division*—see the appendix for the diagram). The standard psychological view is supposed to hold that neither offshoot is identical to the pre-fission subject in Division. Now, the only difference between Division and Seconds-delayed Division is that in the latter one offshoot gains consciousness only a few seconds later than the other offshoot. This temporal disparity, however, is too slim to produce a significant difference between the two cases with respect to how the pre-fission subject is psychologically connected to the two resulting offshoots—in both cases, the original person is strongly psychologically connected to both offshoots to almost the same degree. Hence, the standard psychological view should hold, just as it does in regard to Division, that neither offshoot is identical to the original person in Seconds-delayed Division as well. However, as previously noted, advocates of the Third Route ought to maintain that A'=B' and A'≠D' in Seconds-delayed Division. This means that, among the two resulting persons, whoever "wakes up" first after the surgery is entitled to be the original person. This sounds arbitrary. Imagine that you are one of the surgeons in Seconds-delayed Division who have just performed the surgery. You have just successfully plugged each hemisphere of the original person into the craniums of two distinct human bodies, and are now waiting for the resulting persons to gain consciousness. B' gains consciousness a few seconds earlier than D' does. Now, it would be arbitrary if you claim that B' is the one you have just performed the surgery on while you have never performed a surgery on D'. This sounds arbitrary because B' and D', both being strongly psychologically connected to A' to almost the same degree, seem to have equal claim to be A'. And this is the very intuition that leads the standard psychological view to maintain that neither resulting offshoot is the original subject in Division.

In describing the aforementioned problem, I have assumed that each offshoot comes into existence as soon as the transplanted brain hemisphere

gains consciousness after the surgery. Of course, many can object to this assumption, and they may be right to do so. Nevertheless, I think that a similar problem will arise for the Third Route when we take a different view as to how and when exactly the offshoots come into existence. For instance, suppose we take the view that each offshoot comes into being as soon as each hemisphere is transplanted to the recipient body. The problem then is that, in the case where one hemisphere is transplanted to a body a few seconds earlier than the other hemisphere is transplanted to a different body, it would be arbitrary to hold that the former, and not the latter, is identical to the pre-fission subject. Here again, each offshoot seems to have an equal claim to be the original person insofar as their psychology is concerned. To get around this problem, proponents of the Third Route must be able to explain why the interval between the respective emergences of the two offshoots, no matter how short it is, makes a significant difference to the effect that the earlier but not the later offshoot is identical to the pre-fission subject. They need to explain this without violating the spirit of the standard psychological view.

I have argued that each of the three routes is vulnerable to serious problems. Since anyone who endorses the standard psychological view must take one of them, I submit that the possibility of delayed fission poses a challenge for the standard psychological view of personal identity.[14]

Appendix: Variant cases of fission and their diagrams

(a) Delayed Replication: Scanning the body of the original subject, and after some delay in time, creating an exact replica based on the scanned information;

(b) Delayed Division: Removing the two hemispheres of a brain and transplanting them to different human bodies at an interval of a few days, to the effect that one of the two resulting persons will gain consciousness a few days later than the other;

(c) Half-brain Removal: Removing only one brain hemisphere from the original body and keeping it in a special device permanently;

[14] I am grateful to Dean Zimmerman and Boram Lee for helpful discussions on earlier drafts of this article.

(d) Half-brain Transfer: Removing the two hemispheres of a brain and transplanting one of them to a different human body while keeping the other permanently in a special device;

(e) Indeterminate Division: Same as (d) except that it is not determined whether the hemisphere in the device will be transplanted to a different human body or left in the device permanently;

(f) Seconds-delayed Division: Same as (b) except that the interval between the two resulting persons' gaining of consciousness is only a few seconds;

(g) Division: Removing the two hemispheres of a brain and transplanting them to different human bodies to the effect that the two resulting persons will gain consciousness at exactly the same time.

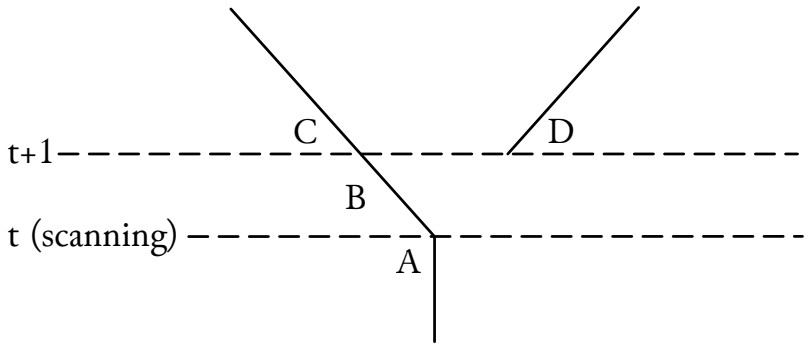

Diagram of Delayed Replication

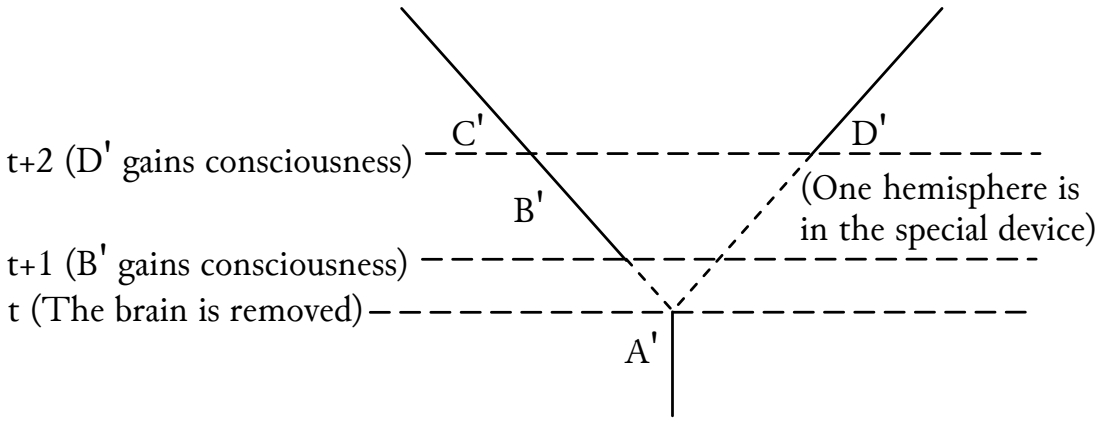

Diagram of Delayed Division and Seconds-delayed Division

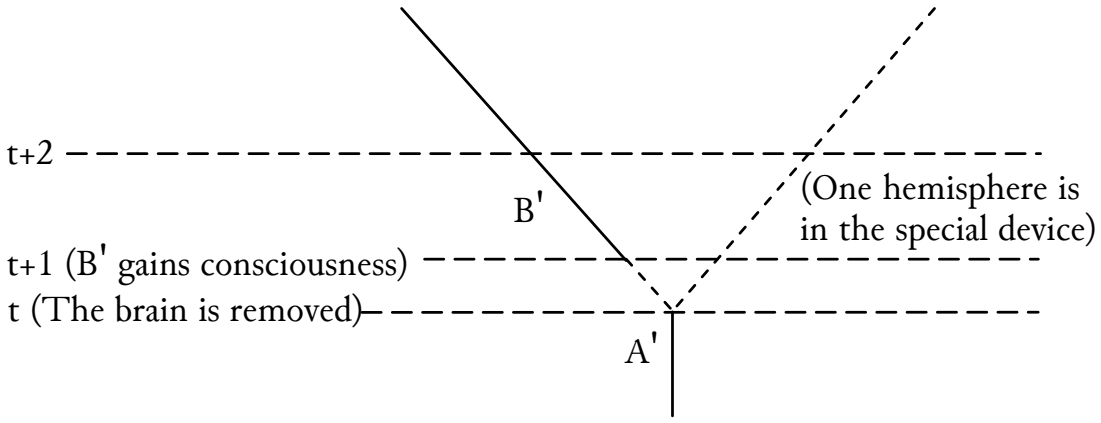

Diagram of Half-brain Removal and Half-brain Transfer

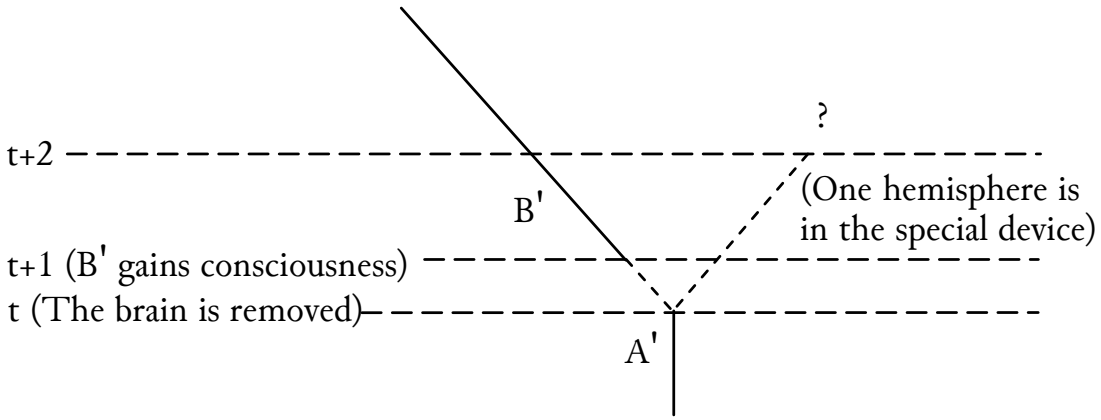

Diagram of Indeterminate Division

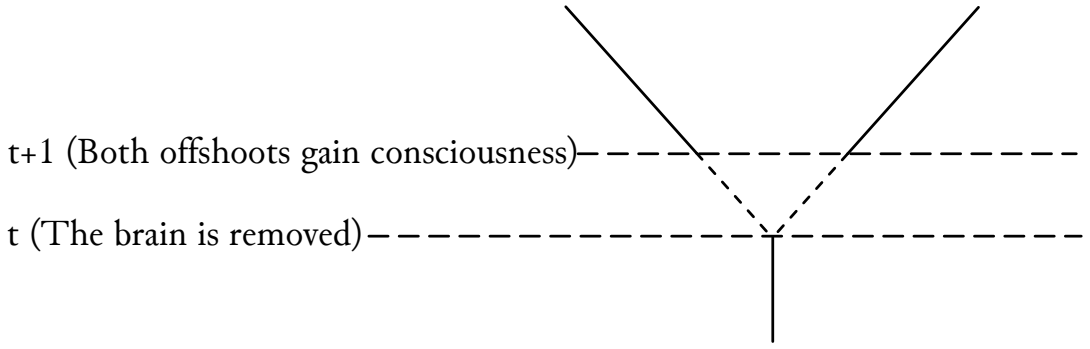

Diagram of Division

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