

Is primitive persistence always objectionable?

Ikuro Suzuki

Introduction

Three-dimensionalism and four-dimensionalism are two major rival theories of persistence.¹ Intuitively, 3d'ism says that material objects are three-dimensional objects “wholly present” whenever they exist. They persist through time by being strictly identical across time, while having different properties and spatial parts at different times. On the other hand, according to 4d'ism, material objects are four-dimensional worms extending through space-time.² They persist through time by having different temporal parts at different times. Thus, 3d'ism and 4d'ism give conflicting pictures of persistence.

Although much effort has been devoted to the debate between 3d'ism and 4d'ism, neither has procured an argument effective enough to dispel the other. Michael Della Rocca (2011) calls this current situation “an impasse,” and he tries to break it by way of a subtle argument against 3d'ism.³ His attempt consists of two parts. In the first part, he argues that 3d'ism must endorse primitive persistence, while 4d'ism need not do this. This is, according to him, the fundamental difference between 3d'ism and 4d'ism. In the second part, he argues that a commitment to primitive persistence is inconsistent with what he calls “Parfit's

¹ Hereafter, I will follow Della Rocca in using the abbreviations “3d'ism,” “4d'ism,” “3d'ist,” and “4d'ist.”

² For the sake of simplicity, I assume the standard version of 4d'ism, that is, the worm theory throughout this paper.

³ In that paper, he also gives an argument against 4d'ism with a commitment to primitive persistence and defends some version of identity of indiscernibles. However, here I focus exclusively on his argument against 3d'ism.

Plausible Principle (PPP),” a highly plausible principle about persistence. These two parts, if both are sound, pose a serious argument against 3d’ism.

The aim of this paper is to counter Della Rocca’s second argument in order to rescue 3d’ism with a commitment to primitive persistence. To do so, I discuss Della Rocca’s first argument in §2, contending that it is insufficient to show that 3d’ism is committed to primitive persistence. However, my main aim is not to criticize this point but rather clarify, by examining his argument, what primitive persistence is and why it can be important for 3d’ism. In the following two sections, I discuss Della Rocca’s second argument. In §3, I give a summary of his second argument and identify its crucial premise. Then, in §4, I counter the argument by clarifying the 3d’ists’ account of persistence. A closer examination reveals that 3d’ists need not claim that primitive persistence must be *totally arbitrary*. Primitive persistence can be *qualitatively and causally grounded*. With this distinction, I show that PPP is consistent with a commitment to primitive but qualitatively and causally grounded persistence. Thus, I conclude that a commitment to primitive persistence is not always objectionable.

Primitive persistence and 3d’ism

According to Della Rocca, the fundamental difference between 3d’ism and 4d’ism lies in their accounts of persistence. To prove this, he begins by pointing out that 3d’ism and 4d’ism share a basic assumption about persistence. We can put the common assumption as follows:

- (P) Persistence of an object X from t_1 to t_2 occurs in virtue of qualitative and causal continuity between the state at t_1 of an object, A , and the state at t_2 of an object, B .

Roughly speaking, A ’s state at t_1 and B ’s state at t_2 are qualitatively continuous iff they are similar enough in certain qualitative aspects and there is no drastic change between t_1 and t_2 . Additionally, they are causally continuous iff there is a certain kind of direct or indirect causal connection between them. Thus, 3d’ism and 4d’ism agree that persistence is explained by qualitative and causal continuity between two states of object(s) at different times.

Then, what is the difference between 3d’ism and 4d’ism? Della Rocca argues that the difference emerges when (P) is incorporated into the metaphysical framework of each. Let us start with 4d’ism. According to 4d’ism, an object X persisting from t_1 to t_2 is a spatio-

temporal worm extending from t_1 to t_2 . Its persistence is explained by qualitative and causal continuity between the states of temporal parts existing at t_1 and t_2 . So, 4d'ists understand (P) in the following way:

- (4dP) Persistence of a spatio-temporal worm X from t_1 to t_2 occurs in virtue of qualitative and causal continuity between the state of X 's temporal part at t_1 , A , and the state of X 's temporal part at t_2 , B .

The crucial point is that, for 4d'ists, A and B are *numerically different objects* (and each of them is also not identical to X). They are two different temporal parts of X existing at different times. So, 4d'ists explain the persistence of a spatio-temporal worm X by the qualitative and causal facts about two different objects at different times.

On the other hand, 3d'ists cannot understand (P) in that way. For them, a persisting object X is a three-dimensional object that is strictly identical across time. As far as they are 3d'ists, they cannot explain persistence by appealing to temporal parts. Then, what do “ A ” and “ B ” in (P) mean for 3d'ists? Della Rocca's answer is that they must refer to X , the persisting object itself. So, 3d'ists must understand (P) as follows:

- (3dP) Persistence of an object X from t_1 to t_2 occurs in virtue of qualitative and causal continuity between the state at t_1 of X and the state at t_2 of X .

However, Della Rocca argues, if the 3d'ists' account comes down to (3dP), they must accept that persistence is *primitive*. For (3dP) explains X 's persistence by the fact that the single object X exists at t_1 and t_2 and has different states connected by qualitative and causal continuity. However, the fact that X exists at t_1 and at t_2 means nothing but the fact that X *persists from t_1 to t_2* . So, in (3dP) “the persistence of the object is explained in part in terms of the persistence of the object itself.”⁴ In this vein, persistence must be primitive for 3d'ists. By contrast, 4d'ists need not endorse primitive persistence, since they can explain persistence by continuity between the states of *different* objects. Hence, Della Rocca concludes that 3d'ism is committed to primitive persistence, while 4d'ism need not be.

Yet, this argument is insufficient to show that 3d'ism is committed to primitive persistence. To find out why, it is enough to point out that there have been many attempts to avoid primitive persistence within the framework of 3d'ism. The most famous example of this kind of “reductive explanation” can be found in the realm of personal identity.⁵ According

⁴ Della Rocca (2011): p. 596.

⁵ For a clear example, see Shoemaker (1984): sect. 8.

to a certain type of reductive explanation of personal identity, we can explain the persistence of a person by the fact of psychological continuity between *two different synchronically unified mental states* at different times. So, it seems possible that 3d'ists explain the persistence of person reductively by using these mental states.⁶ If this kind of reductive explanation is possible in general, 3d'ists can avoid primitive persistence. Without showing that this type of reductive explanation is unpromising at least for some objects, Della Rocca's argument is insufficient to show his intended conclusion.

However, his argument is still of value, since it tells us that if there are good reasons for 3d'ists to be pessimistic about the global success of reductive explanations, they will be drawn to accepting primitive persistence after all. In fact, there are several of them. First, the attempt to give reductive explanations will be more difficult for 3d'ists than for 4d'ists. For 4d'ists, in general, it is always guaranteed that at any time a persisting object exists, there is its temporal part existing only at that time. These temporal parts provide appropriate resources for 4d'ists to explain persistence reductively. On the other hand, it is not guaranteed that 3d'ists can find appropriate entities for reductive explanations because of their dismissal of temporal parts. Furthermore, if 3d'ists wish to give reductive explanations generally, they will be committed to an ontology very similar to that of 4d'ists: they need to explain any short span of persistence by continuity between two, much shorter-lived, different objects. This puts them in danger of accepting the claim that at any time a persisting object exists, there is a short-lived object that exists only at that time.⁷ This is very similar to one standard definition of 4d'ism.⁸ In this case, the question "why not 4d'ism?" would be pressing.

⁶ Generally speaking, in order to make it possible to explain persistence of an object reductively by using a certain kind of entities (objects, states, events and so on), these entities must satisfy the following two conditions. First, they must be *plentiful* enough that we can explain any span of persistence of the object by two different entities of this kind existing at different times. Second, they must be *independent* of the object: it must be possible for us to specify whether entities of this kind are related by qualitative and causal continuity without presupposing persistence of the object. Della Rocca seems to simply presuppose that any state of a person cannot be independent in this sense, but this is far from obvious since many 3d'ists defend that synchronically unified mental states satisfy both conditions.

⁷ Following Perry (2002), one might try to avoid this commitment by using place-times as substitutes. This move would rescue 3d'ism from collapsing into 4d'ism but might be problematic as such. For it would suggest that qualitative and causal continuity holds between different place-times.

⁸ See Sider (2001): pp. 59–60.

Finally, independent of Della Rocca's argument, there may be another factor that draws some 3d'ists to accepting primitive persistence. Some 3d'ists believe that certain kinds of objects (for example, people, sub-atomic particles and so on) deserve the name "substance." That is, their identity does not depend on other things outside of themselves.⁹ Hence their persistence cannot be explained through the qualitative and causal facts about much shorter-lived objects. From this perspective, (3dP) comes as no surprise and just shows the fundamentality of substances.¹⁰ Thus, even though Della Rocca's argument is insufficient to prove it, there are several good reasons for 3d'ists to endorse primitive persistence.

PPP and primitive persistence

However, the second part of Della Rocca's argument poses a serious threat to 3d'ism with a commitment to primitive persistence. According to him, a commitment to primitive persistence is inconsistent with "Parfit's Plausible Principle (PPP)."

To explain this, let us consider Derek Parfit's famous example in which a person undergoes fission. Suppose that a person *A* exists at t_1 , and at some later time t_2 , *A* undergoes brain surgery. Both of *A*'s hemispheres are removed from *A*'s body and then each is put into two perfectly similar bodies. At a much later time t_3 , there are two resulting people *B* and *C*. Suppose further that in this case fission is symmetrical. That is, *B* and *C* are equally qualitatively and causally continuous with *A* in certain, significant ways.

Then, what happens to *A* in this example? There are, as Della Rocca argues, at least four possibilities:

- (i) $A = B$ and $A = C$
- (ii) $A = B$ and $A \neq C$, or, $A \neq B$ and $A = C$
- (iii) A = the sum of *B* and *C*
- (iv) $A \neq B$ and $A \neq C$

It is well known that each possibility faces difficulties. However, it is not relevant here which the correct description of the case is. The important point is that possibility (ii) is widely considered highly implausible. In this example, we have stipulated that fission is symmetrical. It seems *arbitrary* to think that only *B* or *C* is identical to *A*. From this obser-

⁹ For a clear example, see Lowe (1991, 1998: chap. 7).

¹⁰ I do not exclude the possibility that even 4d'ists may have reasons to believe in the existence of substances. However, I do not dwell on this point further here.

vation, Della Rocca draws a general principle about persistence in the case of symmetrical fission and calls it “Perfit’s Plausible Principle.”

(PPP) In a case in which there are objects A , B , and C , $B \neq C$, B and C are equally and significantly causally and qualitatively continuous with A , and there is no other object besides A which exists at the same time as A and which is such that B and C are as causally and qualitatively continuous with it as they are with A , then it cannot be the case that $A = B$ and $A \neq C$ and it cannot be the case that $A \neq B$ and $A = C$.¹¹

Thus, PPP explicitly rules out the possibility that A is identical to only B or C without any difference in qualitative or causal continuity. Della Rocca points out that PPP is extraordinarily plausible, and that no philosopher clearly rejects it. So he concludes that there is an extremely good reason to accept PPP.

Next, he points out that anyone who accepts PPP must concede that in cases like symmetrical fission, there must be some explanation of trans-temporal identity and nonidentity. So, anyone who accepts PPP must reject any “ungrounded and inexplicable”¹² identity. From this point, he concludes that anyone who accepts PPP must reject primitive identity. He argues:

Indeed, PPP seems to presuppose the more general claim that trans-temporal identity and nonidentity, as such, cannot be primitive. To see why, consider that in insisting on PPP, one claims that it cannot be that $A = B$ (say) and $A \neq C$ and that this is so because such identity and nonidentity would be arbitrary, primitive. In affirming PPP, we reject certain claims of identity and nonidentity precisely *because* the identity and nonidentity would be primitive.¹³

However, he is too quick to identify being primitive with being arbitrary – that is, ungrounded and inexplicable in his sense. Separating primitiveness and arbitrariness is, I believe, crucial for evaluating his argument. Moreover, it is also important to clarify what he means by these terms. Let us suppose that $A = B$ and $A \neq C$ in a case of symmetrical

¹¹ Della Rocca (2011): p. 599. By the clause starting with “and there is no ...,” he intends to exclude the possibility that there were two persons before the brain surgery, as multiple-occupancy theorists claim. For the most famous defense of multiple-occupancy theory, see Lewis (1976).

¹² Della Rocca (2011): p. 602. Italics are mine.

¹³ Della Rocca (2011): p. 602.

fission (this is the most obvious case in which identity and nonidentity are arbitrary, ungrounded, and inexplicable in his sense). By claiming that trans-temporal identity $A = B$ and nonidentity $A \neq C$ are arbitrary, ungrounded, and inexplicable, Della Rocca indicates that, in this case, these identity and nonidentity are *independent* of qualitative and causal continuity in the sense that there can be difference in identity without any difference in qualitative and causal continuity. Thus, these identity and nonidentity have no ground in qualitative and causal continuity and there is no explanation of them except the trivial one that $A = B$ because $A = B$, and $A \neq C$ because $A \neq C$. Now let us define the concept of *total arbitrariness* to illustrate this point.

For certain object(s) X and Y , trans-temporal identity $X = Y$ and nonidentity $X \neq Y$ are *totally arbitrary* iff identity and nonidentity of X and Y are independent of qualitative and causal continuity in the sense that there can be difference in identity without any difference in qualitative and causal continuity. And there is no explanation of them, except that $X = Y$ because $X = Y$, and $X \neq Y$ because $X \neq Y$.

Then, if $A = B$ and $A \neq C$ in a case of symmetrical fission, their trans-temporal identity and nonidentity are totally arbitrary.

In arguing against primitive persistence, Della Rocca assumes that if persistence is primitive, it must be totally arbitrary. To make this point explicit, let us formulate Della Rocca's arguments as follows:

- (1) PPP.
- (2) PPP commits one to the rejection of totally arbitrary persistence.
- (3) Primitive persistence must be totally arbitrary.
- (4) Then, we must reject a commitment to primitive persistence.

This argument, if sound, poses a serious problem to 3d'ists who accept primitive persistence.

However, is the argument sound? I agree with him that it is valid. Contra Baker (2013a, 2013b chap. 7), I think that premise (1) is very plausible.¹⁴ To deny PPP means to accept

¹⁴ Lynn Rudder Baker argues that if 3d'ists wish to endorse primitive persistence, they must reject PPP. However, this seems not only implausible but also unnecessary, because her "Not-So-Simple Simple View" [Baker (2013b): pp. 147–156] seems to fit well with the claim that primitive persistence is qualitatively and causally grounded in the sense explained below.

the possibility that in some cases of symmetrical fission, $A = B$ and $A \neq C$. However, this acceptance seems intolerable since it makes trans-temporal identity and nonidentity mysterious. If we deny PPP, we must accept the possibility that $A \neq C$ even though A is qualitatively and causally continuous with C . However, then, it seems that we cannot exclude the possibility that you are not identical with the person who read several lines before this sentence a few seconds ago, even though you are qualitatively and causally continuous with the person, and there is no explanation why, except that you are different just because you are different. Such a possibility seems highly arbitrary and implausible.¹⁵ Therefore, the theoretical cost of denying PPP seems high. Additionally, we have a good reason to believe premise (2). Suppose that we accept totally arbitrary persistence. Then, we would admit the possibility that in some cases, trans-temporal identity and nonidentity is independent of qualitative and causal continuity. However, if so, we would have no reason to believe PPP, since in this case it seems impossible to exclude the possibility that in some cases of symmetrical fission $A = B$ and $A \neq C$. Thus, a commitment to totally arbitrary persistence would undermine the reason to believe PPP. Therefore premise (2) is well founded. On the other hand, Della Rocca does not provide – nor can we find – any convincing reason to believe premise (3). In the next section, I will show that (3) must be false, since primitive persistence can be *qualitatively and causally grounded* in the sense I will explain below. The apparent persuasiveness of his argument, I think, comes from failing to distinguish totally arbitrariness and qualitative and causal groundedness.

Primitive persistence qualitatively and causally grounded

To show this, we need to examine the 3d'ists' account of persistence more carefully.¹⁶ In §2, we characterized the 3d'ists' account of persistence as follows:

(3dP) Persistence of an object X from t_1 to t_2 occurs in virtue of qualitative and causal continuity between the state at t_1 of X and the state at t_2 of X .

To extend this explanation to cases of trans-temporal nonidentity, let us rewrite (3dP) in the following way. Suppose that “ X ” is the name of a persistence object of a certain kind existing at t_1 and “ Y ” is the name of a persisting object of the same kind existing at t_2 . “ R ”

¹⁵ Della Rocca raises a similar criticism in Della Rocca (2011): p. 604.

¹⁶ For the sake of simplicity, here I assume that 3d'ists are not committed to any reductive explanations.

is the name of the qualitative and causal continuity that is relevant to objects of this kind.

Then, we can reformulate the 3d'ists' account of persistence as follows:

(3dTI) $X = Y$ because the state at t_1 of X and the state at t_2 of Y are related by R .¹⁷

This reformulation does not change any substantial point. As Della Rocca argues about (3dP), the trans-temporal identity of X and Y is primitive in (3dTI) too. For (3dTI) explains trans-temporal identity by the persisting object (called by two names “ X ” and “ Y ”) existing at t_1 and t_2 , and the presence of R .

Now, we can characterize 3d'ists' explanation of trans-temporal nonidentity in a similar fashion.

(3dTN) $X \neq Y$ because the state at t_1 of X and the state at t_2 of Y are not related by R .

Here again, trans-temporal nonidentity is primitive, since (3dTN) explains the nonidentity of X and Y by two different objects, X and Y themselves, and the absence of R . Thus, nonidentity itself is presupposed in (3dTN) as well.

If trans-temporal identity and nonidentity are primitive in (3dTI) and (3dTN), one may protest that (3dTI) and (3dTN) do not “explain” identity and nonidentity at all, since their explanans presuppose identity and nonidentity that are supposed to be explained.¹⁸ However, while it is admitted that (3dTI) and (3dTN) presuppose what is to be explained, they also carry the important information about qualitative and causal continuity that is tightly connected to trans-temporal identity and nonidentity. So, they are far from trivial and can be called explanations in a broad sense. To see this more clearly, let us compare (3dTI) and (3dTN) with the following questionable accounts of trans-temporal identity and nonidentity.

(QTI) $X = Y$ because $X = Y$.

(QTN) $X \neq Y$ because $X \neq Y$.

(QTI) and (QTN) are obviously trivial and tell us nothing about trans-temporal identity and nonidentity at all. On the other hand, in (3dTI) and (3dTN) qualitative and causal

¹⁷ Note that even if 3d'ists accept (3dTI), it does not follow that they must accept that in a case of symmetrical fission, $A = B$ and $A = C$ since A is related by R with both of B and C . (3dTI) is consistent with the claim that it is impossible that an object is related by R with two different objects.

¹⁸ So, (3dTI) and (3dTN) are in a sense circular, while I cannot go further into this point here. For a more detailed explication of the circularity involved in (3dTI) and (3dTN), see Horsten (2010) and Pedrosó (2007). My claim is closely related to their theses that impredicative and circular criteria of identity can be informative.

continuity plays a more important role. (3dTI) and (3dTN) specify what kind of qualitative and causal continuity is *relevant* to trans-temporal identity and nonidentity in the sense that its presence and absence are *necessarily correlated* with the identity and nonidentity of X and Y . Qualitative and causal continuity is an inseparable constituent of the explanation of trans-temporal identity and nonidentity in the following way: $X = Y$ because X and Y are related by R , and $X \neq Y$ because X and Y are not related by R . Now, let us define the concept of *qualitative and causal groundedness* as follows.

For any X and Y , the trans-temporal identity $X = Y$ and nonidentity $X \neq Y$ are *qualitatively and causally grounded* iff there is some qualitative and causal continuity R that its presence and absence are necessarily correlated with identity and nonidentity of X and Y . This continuity R is an inseparable constituent of the explanation of identity and nonidentity of X and Y in the way that $X = Y$ because X and Y are related by R , and $X \neq Y$ because X and Y are not related by R .

Thus, in (3dTI) and (3dTN) trans-temporal identity and non-identity are not totally arbitrary, but qualitatively and causally grounded.

This distinction is crucial in evaluating Della Rocca's argument. In §3 I formulated it as follows:

- (1) PPP.
- (2) PPP commits one to the rejection of totally arbitrary persistence.
- (3) Primitive persistence must be totally arbitrary.
- (4) Then, we must reject a commitment to primitive persistence.

If this is a correct rendering of his argument, the argument cannot be sound since (3) must be false. However, how about a parallel argument against primitive but qualitatively and causally grounded persistence?

- (1) PPP.
- (2*) PPP commits one to the rejection of primitive but qualitatively and causally grounded persistence, too.
- (3*) Then, we must reject a commitment to primitive persistence, even if it is qualitatively and causally grounded.

In this case, however, we have no reason to believe (2*). To show that, let us make sure that there is *no* tension between primitive but qualitatively and causally grounded persistence

and PPP. Suppose that primitive persistence is qualitatively and causally grounded. Then, we cannot admit the possibility that, in a case of symmetrical fission, $A = B$ and $A \neq C$. To see why, let us assume that $A = B$ and $A \neq C$. According to our supposition, trans-temporal identity and nonidentity are qualitatively and causally grounded. There must, therefore, be a qualitative and causal continuity R such that A is related by R with B and A is not related by R with C . If so, this *cannot* be a case of symmetrical fission, since B and C are *not* equally qualitatively and causally continuous with A . Then, as far as persistence is qualitatively and causally grounded, we cannot admit the possibility that violates PPP. Accepting PPP does not give us any reason to reject a commitment to primitive but qualitatively and causally grounded persistence. So we must reject (2*).

Therefore, Della Rocca's second argument against primitive persistence fails to show that a commitment to primitive persistence must be inconsistent with PPP. What he has shown is at most that PPP is inconsistent with primitive and totally arbitrary persistence. As far as primitive persistence is qualitatively and causally grounded, however, a commitment to primitive persistence is consistent with PPP. So, 3d'ists can accept primitive persistence without rejecting the very plausible principle about persistence. From this, I conclude that a commitment to primitive persistence is not always objectionable. It is still a viable option for 3d'ists.

Concluding remarks

So far, I have shown that we can accept PPP as an extraordinarily plausible principle without rejecting a commitment to primitive persistence, as far as it is qualitatively and causally grounded. Finally, let us clarify what this conclusion tells us about primitive persistence.

The most important conclusion that we can draw from it is that we should distinguish between being primitive and being arbitrary. The crucial flaw in Della Rocca's argument is that it fails to see that persistence can be primitive without being separated from any qualitative and causal facts about persisting objects. Of course, when the persistence of some kind of objects is primitive, we cannot reductively explain their persistence by any qualitative or causal fact about much shorter-lived objects. In this sense, if persistence is primitive, persistence is *sui generis* and fundamental. However, this does not mean that persistence must be completely independent of, or "hovering freely over,"¹⁹ qualitative and

¹⁹ I owe this phrase to a comment by Kristie Miller.

causal facts. There is nothing in the claim that persistence is primitive which prevents primitive persistence from being qualitatively and causally grounded. It is perfectly possible that trans-temporal identity and nonidentity are necessarily correlated with a certain kind of qualitative and causal continuity. In fact, it can be argued that it is not only possible but necessary, given the highly plausibility of PPP. As we saw in §2, anyone who accepts PPP must reject the claim that primitive persistence is totally arbitrary. Therefore, if PPP is an extraordinarily plausible principle, primitive persistence cannot be totally arbitrary. This tells us something important about primitive persistence: it is defensible only when it is grounded in qualitative and causal facts about persisting objects.

Acknowledgement

I am grateful to all participants of A Frontier of Philosophy of Time Conference, and also to Lajos Brons, Wolfgang Ertl, Shoko Kinoshita, Atsushi Takada, and Takashi Yagisawa for helpful comments on this paper.

References

- [1] Baker, L. R. (2013a) “Three-Dimensionalism Rescued: A Brief Reply to Michael Della Rocca”, *Journal of Philosophy* 110: 166–170.
- [2] Baker, L. R. (2013b) *Naturalism and the First-Person Perspective*, Oxford: Oxford University Press.
- [3] Della Rocca, M. (2011) “Primitive Persistence and the Impasse between Three-Dimensionalism and Four-Dimensionalism”, *Journal of Philosophy* 108: 591–616.
- [4] Horsten, L. (2010) “Impredicative Identity Criteria”, *Philosophy and Phenomenological Research* 80: 411–439.
- [5] Lewis, D. (1976) “Survival and Identity”, in A.O. Rorty (ed.), *The Identities of Persons*, Berkeley: University of California Press, 17–40.
- [6] Lowe, E. J. (1991) “Real Selves: Persons as a Substantial Kind”, *Royal Institute of Philosophy Supplement* 29: 87–107.
- [7] Lowe, E. J. (1998) *The Possibility of Metaphysics: Substance, Identity, and Time*, Oxford: Oxford University Press.
- [8] Pedroso, M. M. (2007) “Criteria of Identity and their Logical Form”, *Logic Journal of IGPL* 15.5–6, 759–765.
- [9] Perry, J. (2002) “The Two Faces of Identity”, in his *Identity, Personal Identity, and the Self*, Indianapolis: Hackett Publishing, 64–83.

- [10] Shoemaker, S. (1984) “Personal Identity: A Materialist’s Account”, in S. Shoemaker and R. Swinburne, *Personal Identity*, Oxford: Blackwell, 67–132.
- [11] Sider, T. (2001) *Four-Dimensionalism: An Ontology of Persistence and Time*, Oxford: Oxford University Press.