Limit Deciding Dispositions.
A Metaphysical Symmetry-Breaker
for the Limit Decision Problem

Florian Fischer
University of Siegen

Florian Fischer is a post-doc at the University of Siegen. His research spans from metaphysics to logic and the philosophy of science. His works focuses on problems concerning the nature of time: temporal existence, persistence, causation (with a particular attention to dispositions).

There are basically four options to which state the limiting instant in a change from one state to its opposite belongs – only the first, only the second, both or none. This situation is usually referred to as the *limit decision problem* since all of these options seem troublesome: The first two alleged solutions are asymmetric and thus need something to ground this asymmetry in (a symmetry-breaker); while the last two options leave the realm of classical logic. I argue that including the debate about dispositions enables new options for solutions to the temporal limit decision problem. Metaphysical considerations function as a symmetry-breaker and thus remove the need for a non-classical solution. Dispositions bring about the changes in the world, so they constitute the metaphysical background for the instant of change. In particular, I argue that according to the *triadic process account of dispositions,* the limiting instant belongs to the second interval and only the second interval.

LIMIT DECISION PROBLEM

MOMENT OF CHANGE

DISPOSITIONS

MANIFESTATIONS

PROCESSES

Philosophy Kitchen #13 — Anno 7 — Settembre 2020 — ISSN: 2385-1945 — Il Tempo e il Continuo.

129

I.   Introduction

The so-called limit decision problem is a particularly tricky problem in theoretical philosophy. It has a long history **1** and is still the subject of a lively debate. **2** The temporal version of the limit decision problem is often referred to under the heading «the moment of change» and it circles around the question of how to describe the change from one state to its opposite. Take the well-discussed example of the change between rest and motion. **3** Clearly, there is a moment when the object in question, say a car, is still in rest, and clearly, there is a later moment where it is moving. The question is until when exactly the car is motionless and from exactly what time on it is in motion. Is there a first instant of motion? Is there a last instant of rest?

　　　　Under the assumption that time is continuous, we can think of the situation in terms of two adjoining intervals and the border between them. The question then becomes to which interval the border belongs. Prima facie, **4** there are four options: the moment of change belongs to the first interval and only the first interval; or it belongs to the second and only the second; or it belongs to both; or neither. It is called the limit decision *problem,* since all four options seem problematic. The last two options have the problem that they seem incompatible with classical logic, abandoning the *principle of bivalence*. Though the first two options are compatible with the classical logic, they are asymmetric, which raises the question of why the limiting instant should be assigned to the one interval *rather* than the other. At this point, it's not a question of logic anymore, i.e., logic cannot decide between the first two options.

　　　　The paper is structured as follows. In the second section, I introduce the limit decision problem for change. I focus on the systematic aspects of the exposition of the problem, rather than its history. The asymmetry of the possible solutions that are compatible with classical logic brings with it the need for something to decide one way or the other. I propose that dispositions can function as a *symmetry-breaker* for these cases. Therefore, I first introduce my favourite theory of dispositions, the triadic process account of dispositions, in section III, and then lay down the implications for the debate about the moment of change in the fourth section. In the final section, I take a step back and evaluate the argumentative setup of the paper.

1 See Strobach (1998) for an overview of the history of the debate about the moment of change and the systematic answers to it. There, Strobach states that «[i]nterestingly, almost every systematically conceivable answer concerning the moment of change has been argued for in the past» (Strobach 1998, 1).
2 See, for example, (Roques et al. (2018) for a recent collection of essays on the «The Instant of Change». The remarkable thing about this collection is that they include contributions from scholars of the medieval was well contemporary debate about limit decision problem.
3 Although quite prominent, this example is problematic because it involves the «question of how to define rest and motion» (Strobach 1998, 247). Motion has always been a prime example of change itself.
4 The options mentioned here do not exhaust the solution space. Besides the four options discussed, Strobach introduces the *either-way-option*: «In a certain respect, the old state still obtains at the limiting instant, in another respect it does not. Moreover, in a certain way the new state already obtains at the limiting instant, but in another way it does not» (Strobach 1998, 6). Also, sometimes a *mixed description* is suggested, as Strobach points out, i.e., that there are different sorts of changes that require different solutions to the limit decision problem. We will come back to this in section IV.

II.   The Moment of Change

To begin with, think of any temporal boundary that interests you. Before the boundary one state obtains and afterward another. Whether you fear or anticipate the new state or if you are emotionally indifferent, a theoretical question arises regarding the

nature of the boundary: which state obtains at the boundary? Already at this level of abstraction, it is clear that there are, in principle, four answers. Since both the old and the new state can either obtain or not at the border, basic combinatorics yields the following four answers.

1. The old state and the old state only obtains at the border
2. The new state and the new state only obtains at the border
3. Both states obtain at the border
4. Neither state obtains at the border

This is the contentual way of framing the temporal limit decision problem. But one could also phrase it in terms of intervals. Take two adjoining intervals in the (one-dimensional) time continuum. Call the border between them the limiting instance. To which interval does the limiting instance belong? Once again, basically, there are four solutions.

1'. The limiting instance belongs to the first interval, and to the first interval only
2'. The limiting instance belongs to the second interval, and to the second interval only
3'. The limiting instance belongs to both intervals
4'. The limiting instance belongs to neither interval

With the common (Cantorian) distinction between open and closed intervals, we can depict the situation more formally. In general, a set of real numbers lying between two numbers is an interval. These two numbers are called the *extremities* of the interval. An interval is called «closed» if it includes its extremities and «open» if it excludes them. For example, the set of numbers $0 < x \le 1$ is a left open and right closed interval, as it excludes 0 but includes 1. This is depicted as $(0,1]$ or $]0,1]$.

For our purpose, it only matters what is going on at $t1$. We can thus oppress the left border of the first interval and the right border of the second interval. You could set it to an arbitrary number properly smaller (or respectively properly higher) than $t1$, or you could just use $-\infty$ and $+\infty$, respectively. As we are focusing on $t1$, we can also drop the talk of left and right in the context of open and closed. Unless stated explicitly otherwise, «open» and «closed» means «open at $t1$» and «closed at $t1$», respectively.

Now, we can frame the four basic solutions in terms of open and closed intervals:

1".	First interval open, second interval closed	$...t1)$, $[t1...$
2".	First interval closed, second interval open	$...t1]$, $(t1...$
3".	Both intervals closed	$...t1]$, $[t1...$
4".	Both intervals open	$...t1)$, $(t1...$

To see clearly why the limit decision is called «problematic», let's look at a simple example: a change from rest to motion. Say there is a time $t0$ ($t0 < t1$) at which we can safely ascribe rest, and then there is later time $t2$ ($t1 < t2$) at which we can safely ascribe motion. This is not about vagueness, so assume further that the object in question, say a car, exemplifies rest up until t1; and motion from t1 on onward. So: REST ($t0, t1$) that is $\{x \in \mathrm{R} \mid t0 < x < t1\}$ and MOTION ($t1, t2$) that is $\{x \in \mathrm{R} \mid t1 < x < t2\}$.

Even with this all settled, it is still open what property we have to ascribe to *t1*, **5** i.e., the limit decision problem still arises. The motion-example helps us to see the logical consequences of the different possible answers very clearly, so let us list the four basic possibilities, one final time. With R(φ): φ is at rest and M(φ): φ is in motion, we can also formalize the four options:

5 To be more precise, I would have to talk about the car here, since it is not the time itself that has the colour property. The talk about t1 having a colour property should, thus, be understood as a shorthand.

1'''.   *t1* is at rest and at rest only $R(t1) \land \neg M(t1)$
2'''.   *t1* is in motion and in motion only $\neg R(t1) \land M(t1)$
3'''.   *t1* is both at rest and in motion $R(t1) \land M(t1)$
4'''.   *t1* is neither at rest nor in motion $\neg R(t1) \land \neg M(t1)$

The problem, now, is that all four solutions seem troublesome, while it seems like one of them has to be chosen. The last two solutions clash with classical logic, while the first two threaten to be arbitrary. Let me explicate.

You can easily see that the first two solutions are compatible with classical logic. The third and fourth solution, however, seem to reject principles at the heart of classical logic. **6** The third solution goes against the *law of non-contradiction*, which states that a proposition and its negation cannot be true together. The fourth solution goes against the *law of excluded middle,* which state*s* that any proposition is either true or its negation is true. Of course, non-classical logics have been developed, and people have argued for the third and fourth solution. There is a general agreement, however, that the first two solutions would have to be preferred, because they do not *force* a deviation from classical logic.

6 Some philosophers (e.g., Medlin 1963) question the third and fourth solution's incompatibility with classical logic. While I tend to agree, a discussion of this would go beyond the scope of this paper. I follow the standard way of depicting the debate: «The first two options seem arbitrary, the third goes against the law of non-contradiction, and the fourth against the law of excluded middle» (Roques et al. 2018).

But the first two solutions also have their problems. Attributing t1 to only one of the adjoining intervals brings with it the question of how to decide which of the two intervals this is going to be. There need to be some grounds for why the limiting instant should belong to this specific interval. Classical logic only gives us that the instant better be assigned to just one interval, not to *which* one. The first two solutions are, hence, asymmetric – this is why they are compatible with classical logic – but they should not be arbitrary (cf. Sorabji 1976, 69). It would be ad hoc to just randomly assign the limit to one of the intervals. The asymmetry needs to be grounded in something. I use the terminus technicus «symmetry-breaker» for this.

Summing up, the situation seems to be this: the first and second solution are compatible with classical logic; while the third and fourth are not. But the first and second solution are asymmetrical solutions, which brings with it the need for a symmetry-breaker. **7**

7 You should feel the same compulsion to explain why it is explicitly this interval as you feel in the case of Buridan's ass. It seems unintelligible that the donkey can choose a stack of hay if there are no grounds for preferring this particular stack over the other. This can be questioned in the case of Buridan's ass, and someone might think about also questioning it in the temporal limit decision case. Most of the people, however, agree that you

Before we go on with my proposal for a symmetry-breaker – namely the underlying dispositions, which are involved in bringing about the change in question – some remarks are in order.

First, the epistemic and the ontological question regarding the moment of change need to be kept apart. The ontological question is which state or property obtains at the limiting instant or to which interval

the border belongs. The epistemic question is, how do we get to know this. I am solely occupied with the ontological question in this paper. Because of that, there is no risk of confusion, and, thus, I can allow myself some formulations which might have epistemic connotations.

Second, I explicitly limit the discussion of this paper to *temporal* limit decision problems, aka the debate about the moment of change. Consequently, I abstain from any claim regarding the implications of my solutions towards other limit decision cases. 8

Third, the symmetry-breaker is not found in the mathematical description of the problem alone. 9 This is a common assumption, which I just want to make explicit. Note however, that the temporality of the intervals doesn't help *by itself*. Sure, time is asymmetric (future-directed, if you will), but how does this asymmetry translate to the limit decision problem?

Summing up, the task is to find an ontological symmetry-breaker to enable a classical solution to the temporal limit decision problem. This symmetry-breaker is not found in the (formal) description of the situation and, thus, we need external input. Obviously, we cannot just consider *anything* as external input; it needs to be relevant for the problem at hand. However, looking at the metaphysics of change is not arbitrary – after all, we are concerned with the «moment of change». There is a metaphysical debate on how change is brought about, and this is the debate about dispositions. I turn to this debate in the next chapter and give a brief account of and a short motivation for my favourite theory of dispositions.

III.   Dispositions

In this section, I introduce the main aspects of the debate about dispositions required to introduce my solution to the problem of the instant of change. Standard examples of dispositions are fragility and solubility. These dispositions come with canonical manifestations: fragility can lead to breaking, and solubility can lead to dissolving. The question is, how do dispositions lead to their manifestations? Typically, glass doesn't break for no reason. Only if you strike it with a hammer or throw it to the ground, its fragility manifests. And a sugar cube needs to be put into tea or coffee to display its solubility. It seems like dispositions need a trigger or stimulus to manifest. 10

In a nutshell, the debate about dispositions circles around what I like to call the *prevented manifestation problem*, i.e., cases where the canonic manifestation is absent. There are tons of examples and counterexamples in the literature. 11 Sometimes the problem cases are sorted whether the canonic manifestation is prevented by removing the disposition – these cases are called «finks»; or whether the canonic manifestation does not occur, although the trigger and the disposition are present – these cases are called «masks». There is

---

need grounds for picking one of the first two solutions rather than the other, and I will just assume this for the context of this paper.

8 For example, Brian Medlin considers a problem that occurs in the context of fracturing a martial body (Medlin 1983). Given that no matter can be created or destroyed, one of the surfaces after the fracture should be an open interval and the other a closed. But which is which?

9 An *external* solution, which surpasses the mathematical description of the temporal limit decision problem has the added advantage, that, if you disagree with the representation of time in terms of spatial intervals, as Henri Bergson (Bergson 1910, ch. 2) famously did, you could still agree to the TPD-solution regarding the moment of change.

10 It is controversial whether all dispositions need a trigger. Fundamental dispositions or radioactive decay may be good examples of trigger-free dispositions. I have introduced «trigger-talk», because the counterexamples discussed only arise for dispositions who need a trigger. Note, however, that the TPD does not exclude trigger-free dispositions.

11 To get a glimpse of the various kinds of examples used in the debate about dispositions, take a look at the «case file» in Fischer (2018).

general agreement that masking cases are more problematic than finking cases. For example, if you take the corresponding antidote, you prevent death through a deadly poison. The antidote does neither take away the trigger, as the poison is still ingested (by a human), nor the dispositions, as the poison is still deadly, but it prevents the manifestation nevertheless. Masking cases pose a formidable challenge to any account of dispositions.

Upon the masking cases, there is a particularly nasty subclass: diachronic masking cases (cf. Schrenk 2010, 729). You might think that you could exclude the problem cases by making the trigger more explicit. So, instead of «ingestion» you could insist that «ingestion in the absence of the corresponding antidotes» is the appropriate trigger for the disposition of the deadly poison. The problem is that this does not exclude all prevention cases. Antidotes are often administered after (and, well, because of) the poison. Call cases where the preventer acts after the trigger «diachronic masking cases». As they cannot be fixed by tinkering with the trigger, these cases are the hardest problem cases for a theory of dispositions, for systematic reasons.

This tour de force brought us right to the heart of the contemporary dispositions debate. Of course, I cannot discuss the matter anywhere near exhaustion in this context. In the following, I present my theory of dispositions: the *triadic process account of dispositions* (TPD) and hope that my remarks about the diachronic masking cases at least motivate it. As this paper is concerned with the moment of change, I focus on the application of the TPD to this problem rather than defending it en detail. **12**

The vital bit of the TPD for this paper is the process–understanding of disposition manifestations. **13** Upon reflection, you can see that the diachronic masking cases are so notorious because they include a time gap (Δt) between the stimulus and the canonical manifestation, and because of this temporal gap, «there is the in-principle possibility of an interference» (Schrenk, 2010, 729). Thus, the time span between the ingestion of the poison and the death is the core of the problem.

Note, that temporal action at a distance, even without the possibility of interference, would be ontologically bad. An account that claims that the trigger occurs at *t1* and then there is nothing for some time Δt followed yet again by a manifestation at *t2*, should be rejected in the first place. However, this is not what's going on in the poison case. With the ingestion, a process starts in your body. Sure, the specifics of the process depend on the specific poison and specific body, but in any case, it is not «nothing». A very clear indicator of this is that the poisoning can leave permanent damages to your body, even if the end result of the process (death) can be prevented.

So, in the case of the poisoning, there is a process that starts with the ingestion, and there is a possible end-result of this process. Not much hinges on this, but I'd like to reserve the word manifestation for the process. In this way, it can also be used in cases where there is no natural end-point to the process: for example, think of two particles in the void, thus charged that they repel each other.

According to the TPD, then, the manifestations of dispositions are to be understood as processes. This avoids the temporal-action-at-a-distance-criticism: there

12 I have written a book-length introduction and defense of the TPD. The TPD consists of two parts, which can be understood as its synchronous and diachronous aspects. The synchronous aspect is that it supports a triadic ontology, with a third level in-between dispositions and the resulting behaviour, which I called *wirkungen*. The diachronic aspect is that *wirkungen,* as well as resulting behaviours, have to be understood as processes. See Fischer (2018, ch. 4).

13 There is some terminological dispute going on in the debate about dispositions. Some people use the term «manifestation» for what I have called resultant behaviour; others use the word for my *wirkungen*. But I don't want to let this succumb to a fight about words. As the triadic aspect of the ontology is not important in the context of this paper, I will use the word manifestation indiscriminately. For the official version, see Fischer (2018).

Philosophy Kitchen #13 — Anno 7 — Settembre 2020 — ISSN: 2385-1945 — Il Tempo e il Continuo.

134

is no temporal gap between the process and the trigger. Only the (possible) end of the process is temporally separated from the trigger, not its beginning. The process understanding of manifestations also offers a solution to the diachronic masking cases. This solution is made possible by the same feature of the TPD that allows it to act as a symmetry-breaker regarding the moment of change. I will, hence, discuss it in more detail in the next section.

IV.   Disposition and the Moment of Change

Let us take stock. In section II, we have said that the solutions 1 and 2 to the temporal limit decision problem are to be preferred, because they agree with classical logic. However, they are asymmetric solutions, and this asymmetry needs to be grounded in something. This something can come from outside the mathematics of the continuum, but should, of course, not be something random or ad hoc. But what would be more obvious than to look at the metaphysics of change in the context of the debate about the moment of change? In section III, we have seen that according to the TPD, the manifestations of dispositions are processes. But how does this help with the moment of change? To see how the TPD can act as a symmetry-breaker, we have to look at how the TPD deals with diachronic masking cases.

In a masking case, the manifestation can seemingly be prevented, although the trigger and the disposition are present. Diachronic masking cases are especially vicious as they allow for the prevention to happen after the trigger. Now, according to the TPD, the manifestation is not the end result but the process itself. We have already seen that therefore there is no temporal separation between the trigger and manifestation process. But the TPD also ensures that the process cannot be prevented. Let me explicate. The idea is that even when the end result is prevented, the process itself is not prevented. Remember that in the poison case, a lot of changes in the body of the victim happen, some of them irreversible, even if death is prevented.

The process-understanding of manifestations, according to the TPD, is closely connected to the progressive aspect. **14** Thus, a process is an *ongoing* entity, i.e., it need not be completed to have its full identity. From that it follows, that a process can be interrupted or even cancelled. Somebody can be walking to the university without ever reaching the university (maybe because she is struck by lightning, maybe something more mundane happens). The important thing is that there is an ongoing process that may or may not be completed; depending on the circumstances.

14 There are other understandings of processes, but I'm explicitly only considered with this one. When push comes to shove, I stick with «progressive» rather than with «process» to describe my account. It is because of this understanding that I don't think that processes are essentially temporally extended.

And in turn, this means that, actually, there is no diachronic masking problem. The manifestation process is there, even if it is interfered with or cancelled. Hence, the diachronic masking problem is a conceptual misunderstanding. It just arose, because people were focusing **15** on the end result rather than the process that leads to it. It didn't reach its canonical end result, but the disposition nevertheless was manifest*ing*. Of course, the manifestation can still be prevented. If you take away the trigger or the disposition, no manifestation occurs. Yet, this is no wonder and not problematic. If I do not strike the glass (no trigger) or if I harden it to make it shatterproof (no disposition,

15 It would exceed the limitations of this paper, but there is a story in the background on how the focus of the debate about dispositions ended up being on the result rather than the process. Roughly this has to do with the humean ontology, which is implicitly or explicitly assumed in the debate. For more details, see Fischer (2018, ch. 4).

that is fragility), of course, the glass does not break. But if the disposition is kept, as soon as the trigger there, the manifestation process starts.

Thus, one could simply define the trigger as the beginning of the manifestation process. To be precise, with «the beginning» I do not mean its initial stage but *that* it begins. Hence, it is conceptually impossible that the manifestation (process) is prevented – and thus, the diachronic masking problem is a conceptual misunderstanding. All of this might be controversial. Yet all we need for the problem at hand is that the manifestation (process) begins when the disposition is triggered.

Let us take this to the limit. For the prevention of the manifestation to be conceptually impossible, the manifestation process needs to be present no matter how short a time elapsed. If we (in thought) push the interruption closer and closer to the trigger, we see that the manifestation process must start with a closed interval. There needs to be a first moment of the manifested, because otherwise a mask would still be (conceptually) possible. **16**

Now, it doesn't matter (here) whether you take this to be a viable solution to the diachronic masking problem or not. It should be clear, however, how this is supposed to help in the case of the temporal limit decision problem. But let's be explicit.

The two intervals in question need to have some qualitative difference, otherwise they would not be two. No limit, no limit decisions problem. But this qualitative difference, a dispositionalist would say, is due to (some kind of change): no change, no moment of change. So how would the situation be described in the terms of the metaphysics of change, according to the TPD? At $t1$ there is a change happening. A previously unmanifested disposition is manifesting. It might be for a short while only, but at $t1$ it is manifesting. Thus, the border belongs to the second interval and the second interval only.

Let us discuss this for a moment. First, note that the argument in favour of the second solution via this route consists of two steps. The first step would be the argument for the TPD itself – which we have omitted in this paper. The second step is the translation from the TPD to the temporal limit decision problem. Of course, this second step is open to criticism. I have claimed that the manifestation (process) of a disposition has to start with a closed interval because of the diachronic masking cases. One could accept this but reject that this favours the second solution to the temporal limit decision problem.

And in fact, I find it plausible that the TPD is, in principle, compatible with the third and fourth solution. The idea is that the manifestation and the change in property could come apart. Think about the change from rest to motion. The TPD only enforces that $t1$ is the first moment of the manifestation, not necessarily that it's the first moment of motion. Nothing in the TPD forbids that at $t1$ the object in question is neither at rest nor in motion, or that it is at rest and in motion at $t1$. For, if you have no problem with accepting truth value gaps or gluts, you could still hold the TPD. Still, it is much more natural to pair the TPD with the second solution. How to pair it with the first solution, I cannot see.

An additional way to challenge the second step would be the claim that the TPD is irrelevant for the limit decision problem. **17** The worry is that considering the manifestations of dispositions is changing the subject, especially as the

16 The TPD surely is a minority position. Among other things, it features the claim that the manifestation of powers is synchronic with the trigger. This is very controversial (see e.g., Williams 2019; Maslen 2018 for objections to it), but that is precisely the point. Only because of those «strange» features, the TPD is able to have an impact on the debate about the debate about the limit decision problem. Not any theory of dispositions and processes would do.

17 I would like to thank an anonymous referee for stressing this point.

(potential) end products of (manifestation) processes and the (manifestation) processes themselves have to be distinguished according to the TPD. To dissolve this worry, it is important that we need to be very careful, which dispositions and accordingly which manifestation processes we track. The limit decision problem only arises for *adjacent* states. Thus, whether the process is already in the state of its end result, say whether a breaking glass is already broken, is irrelevant for the question at hand. The limiting instance is between the unbroken and the breaking. The relevant questions are: is there a last moment of the unbroken, and is there a first moment of breaking? And to these questions, the TPD has a definite answer.

There is another potential point of critique for the second step of my argument. In my exposition of the temporal limit decision problem in section II, I have assumed that the four different formulations of the problem are equivalent. But they might not be. Paloma Pérez-Ilzarbe, for example, argues that the temporal question and the ontic question regarding the limit decision problem have to be kept strictly apart. «On the one hand, one can ask about the limit *of the time* that measures a state» and «[o]n the other hand, one can ask about the limit *of the state*» (Pérez-Ilzarbe 2012, 292).

A challenger to my argument could try to object that I only give a solution to one of the questions, either the temporal or the ontic, not the other. But if you grant the transmission from the metaphysics of disposition manifestations to the temporal limit decision problem in the first place, I can't see why there should be *prima facie* a stronger link for any of the two questions.

The combination of the two worries, the compatibility of the TPD with the non-classical solutions and the differentiation of the temporal and the ontic question, give rise to a fall-back option for my argument. The idea is the following. Accepting that the temporal and the ontic question are (partly) independent of each other, i.e., that the question to which interval the temporal instance belongs can have a different answer than the question which state obtains at the border, opens up the possibility of an interesting, complex answer to the limit decision problem. In particular, it allows to combine a symmetric solution regarding the properties involved with an asymmetric solution regarding the temporal instance. This, in turn, shows that accepting a truth value gap or a contradiction regarding the motion at t1, does not settle the temporal question. And then, the TPD still gives us good reasons for an asymmetrical solution to the temporal question, namely the second solution, that the temporal border belongs to the second interval and the second interval only.

Another issue worth discussing is the generality of the TPD solution. Does it hold that every temporal limit decision case has to be treated in the same way? I have based the asymmetry of the solution on the metaphysical asymmetry of disposition manifestation. I have argued that considering dispositions regarding the moment of change is not arbitrary, because dispositions are intimately involved in bringing about changes in the world. But do all changes involve dispositions? So even if one agrees that dispositions are involved in some changes and finds my examples convincing, one could still reject that (the same kind of) dispositions are involved in all changes.

At this point, there are two options: either being a pan dispositionalist or defending a mixed description. If you are a pan dispositionalist, you straight up reject the worry. Pan dispositionalists believe that *every* property is essentially dispositional. All changes in the world involve dispositions, and thus, the generality of the TPD is not limited. The other option is what Strobach calls a *mixed description*, namely that there are «different options for different cases» (Strobach 1998, 12). The TPD would then only be applied to disposition-involving cases. This, of course, does not rule out

that the other cases coincidentally also happen to support the second solution; but the generality of the TPD is restricted.

The last thing I want to discuss is the possible difference between the beginning and the end of a process. One could argue that there is a metaphysical difference between the beginning and the end of a process and that I have only spoken about the beginning. This is a different kind of attack to the generality of the TPD solution. It seems like you can accept everything I have argued for and still hold that the TPD only covers half of the cases. Reconsider the car, which is first in rest than in motion. Now also assume that it comes to rest again after a short period of motion. In this example, there are two interesting limits, the first between the initial rest and the motion; the second between the motion and the later rest. The objection would be that I have given only an account of the first instance.

First, I want to point out that this worry does not challenge the TPD solution itself but merely its generality. So, one option would be to just bite the bullet and accept that the TPD just gives us half of the picture. But maybe we can have more.

Why should we accept the asymmetry between beginnings and ends of processes in the first place? The moving car has the disposition to stop. You can stop it by jamming on the breaks, or it can be stopped in a more unpleasant way by guard rails. We have already given an account about the change from unmanifested to manifesting: the TPD says that there is a first moment of the manifestation process, and hence the second solution is to be also applied in this case. So, the «end» of the one process actually is the beginning of another process.

If this reply is sensible, one could try to draw implications regarding the fundamentality of different kinds of changes from it. Strobach distinguishes successions, or: s-changes and Cambridge-, or: C-changes (Strobach 1998, 2). According to Strobach, an s-change takes place between two positive states, e.g., between rest and motion; while C-changes consist in the beginning or ending of one positive state. Strobach, rightly, points out that «[e]very s-change consists of two C-changes: the ending of the old and the beginning of the new state».

This, in itself, does not imply anything about the fundamentality of the kinds of changes. But if I'm right that the end of a process has to be understood as the beginning of a new process, then the two C-changes involved are not on a par. And this, in turn, suggests that C-changes are ontologically more fundamental than s-changes. The picture is this: we have beginnings of processes (via dispositions manifesting), but each beginning is also the ending of an incompatible process. So, each beginning of motion is also the end of rest, and both together then is the s-change from motion to rest; while each beginning of rest is also the end of motion, and both together constitute the s-change from rest to motion.

This concludes my discussion of the TPD solution to the temporal limit decision problem. Its core – that disposition function as metaphysical symmetry-breaker that favour the second solution, namely that the limit always belongs to the new – is relatively independent of the more speculative considerations at the end of this section. However, I think it all amounts to a nice overall picture. Let us now take a step back and assess the argumentative setup of my account.

V.   Conclusion

I have argued that the TPD allows for a solution to the temporal limit decision problem; but I did not argue for the TPD in this paper, so it might seem that the whole argument is only hypothetically valid. This however, is not the case. First, my goal was

more general than just the TPD. I wanted to show *that* the debate about dispositions is relevant to the debate about the temporal limit decision problem. Regarding this goal, the TPD only was an example with whose help I wanted to show how the debate about dispositions can influence the debate about the moment of change. If my argument was convincing, the claim that dispositions can be the symmetry-breaker is established. Furthermore, I don't know of any other attempt to take a specific theory of dispositions to have implications for the limit decision problem, let alone of any other account of dispositions that could potentially be used. It is the specific understanding of manifestations as processes of the TPD that enabled the transmission to the temporal limit decision problem – and this is unique, as far as I know. As long as there is no other contender, the TPD and with it the debate about dispositions speaks in favour of the second solution: the limiting instance belongs to the second and only the second interval.

But the whole argument can also be read the other way around: *that* it allows for a novel kind of solution to the temporal limit decision problem, speaks in favour of the TPD. It is quite a widespread view to think of philosophical theories in terms of costs and benefits. 18 Given stable costs, the more application cases a theory has, the more profitable it is. Thus, according to the motto «one person's modus ponens is another person's modus tollens» the solution to the temporal limit decision problem is an argument in favour of the TPD. 19

Of course, I do not claim to have solved the limit decision problem once and for all. All I wanted to show was that dispositions allow for a new argument in favour of one of the classical solutions. I hope this will be seen as an advantage by the people who think that we should only accept gaps or gluts if there is no classical solution. My solution would need to be contrasted with the other available solutions in the next step. But this transcends this paper by far. In a nutshell, my goal in this paper was not to try and solve the limit decision problem but to enrich its solution space.

18 I don't think this is the right way to evaluate philosophical theories. I side with John Heil, who campaigns against the misuse of Occam's razor in philosophy (Heil, 2012, 97). Used too early in theorizing, Occam's razor can turn into a straitjacket and hinder the capturing of the complexity of the world. My ontological preference rather matches what James Ladyman and Don Ross have called *Rainforest Realism*. «Ours is thus a realism of lush and leafy spaces rather than deserts, with science regularly revealing new thickets of canopy. Anyone is welcome to go on sharing Quine's aesthetic appreciation of deserts, but we think the facts now suggest that we must reconcile ourselves to live in the rainforest» (Ladyman et al. 2007, 234).

19 So, for example, I cannot see how a (neo-)humean theory of change can be a symmetry-breaker for a temporal limit decision case.

Bibliography

Bergson, H. (1910). *Time and Free Will. An Essay on the Immediate Data of Consciousness*. tr., F. L. Pogson, Montana, Kessinger Publishing Company.

Fischer, F. (2018). Natural Laws as Dispositions. *Philosophical Analysis* 76, De Gruyter.

Heil, J. (2012). *The Universe as We Find It*. Oxford University Press.

Maslen, C. (2018). The case for widespread simultaneous causation. *Philosophical Quarterly* 68 (279): 123-137.

Medlin, B. (1963). The Origin of Motion. *Mind*. 72: 155–175.

Ladyman, J. & Ross, D. with Spurrett, D. & Collier, J. (2007). *Every Thing Must Go, Metaphysics Naturalized*. Oxford: Oxford University Press.

Pérez-Ilzarbe, P. (2012). Socrates desinit esse non desinendo esse: Limit-decision problems in Peter of Auvergne, In J. Leth Fink & H. Hansen & A. M. Mora-Márquez (eds.) *Logic and Language in the Middle Ages. A Volume in Honour of Sten Ebbesen* (287-304). Brill.

Roques, M. & Goubier, F. (eds.) (2018). *The Instant of Change in Medieval Philosophy and Beyond*. Brill.

Schrenk, M. (2010). The powerlessness of necessity. *Noûs*. 44(4): 725–739.

Sorabji, R. (1976). Aristotle on the Instant of Change. *Proceedings of the Aristotelian Society*, Suppl. Vol. 50 [first version].

Strobach, N. (1998). The Moment of Change. A Systematic History in the Philosophy of Space and Time. *The New Synthese Historical Library*, Vol. 45, Springer.

Williams, N. (2019) *The Power Metaphysic*. Oxford University Press.

Philosophy Kitchen #13 — Anno 7 — Settembre 2020 — ISSN: 2385-1945 — Il Tempo e il Continuo.

140