Slow Earth
Draft 6.0

Slow Earth and the Slow-switching Slowdown Showdown

Pete Mandik, William Paterson University
petemandik@petemandik.com

Draft 6.0 (comments welcome)

ABSTRACT: The present paper has three aims. The first and foremost aim is to introduce into philosophy of mind and related areas (philosophy of language, etc) a discussion of Slow Earth, an analogue to the classic Twin Earth scenario that features a difference from aboriginal Earth that hinges on time instead of the distribution of natural kinds. The second aim is to use Slow Earth to call into question the central lessons often alleged to flow from consideration of Twin Earth, lessons having to do with relations of minds to spatially definable boundaries of bodies such as skin or skull. The third aim is to suggest a puzzle for adherents of cognitive content externalism having to do with the metaphysical requirements on slow-switching, a hypothetical process whereby changes in the relations between subjects and their environments are followed by gradual changes in cognitive contents.
1. Introduction

The central concern of this paper is cognitive content externalism, hereafter just externalism. A paradigmatic illustration of the targeted externalism has Oscar and his Twin Earth counterpart thinking thoughts with distinct contents even though the thoughts would be expressed by superficially similar behaviors including verbal behaviors. The thoughts that Oscar and Twin Oscar respectively express by “water”-utterances are thoughts of $\text{H}_2\text{O}$ and XYZ, respectively.

I have three aims regarding externalism in the present paper, all of which pertain to time and its representation. The first aim is to introduce a modification of the Twin

---

1 Many unrelated theories have been labelled externalism in epistemology, ethics, and philosophy of language that have little to no bearing on the present discussions. I will here be concerned with externalism only as it figures in the philosophy of mind. More specifically, I will be concerned with externalism concerning mental contents and have nothing to say of any direct relevance to externalisms about mental vehicles (Clark & Chalmers, 1998; Hurley, 1998). Further, my primary concern is externalism about the content of thought and I have no interest here in the application of externalism to the contents of phenomenally conscious perceptual experience (Dretske, 1995; Tye, 1995).

2 Raising questions about the applicability of externalism to time and its representation is not without precedent, see for example (Jackman, 2005; Pinillos, 2011). It should be noted, though, that Pinillos’s discussion is not so much about content as it is about truth, and Jackman’s discussion is more about the externalistic significance times other than the
Earth thought experiment involving Slow Earth—a version of XYZ-covered Twin Earth where (just about) everything takes hundred times longer to occur than on Earth. While I’m betting that Slow Earth will be intrinsically interesting to aficionados of the externalism debates, I’ll nonetheless draw out two potential lessons from Slow Earth. My second and third main aims concern these two lessons. The second aim is to exploit parallels between Slow Earth and Twin Earth to cast doubt on the significance of spatially (as opposed to, say, epistemically) definable boundaries of pertinence to the study of the human mind. Many discussions of externalism take the relevant sense of “external” to be spatial, but the parallels between Slow Earth and Twin Earth serve to cast some doubt the appropriateness of a spatial analysis.

My third aim is to raise a puzzle for externalism, a puzzle involving the hypothetical process of slow switching. Here’s a paradigmatic illustration of slow switching: Were Oscar stealthily transplanted on Twin Earth, replacing Twin Oscar, the thought contents expressed by Oscar’s “water” utterances would switch slowly from being thoughts of H$_2$O to being thoughts of XYZ. The puzzle I want to raise centers on the question of how the externalist can account for the rate of slow switching. What’s especially puzzling about this question of rate is best brought out by considering certain time of utterance than it is about amounts of time. The present paper is focused on contents concerning amounts of time.

I include the parenthetical “just about” because I do not want it to be stipulated that everything slows down. I want it to be left open, in particular, whether slow switching slows down on Slow Earth.
natural extensions of externalism to contents concerning time. It is a natural extension of externalism to time concepts to hold that Oscar and his counterpart on Slow Earth, Slow Oscar, express different thoughts by utterances employing temporal vocabulary such as “day,” “hour,” and “minute.” A further natural extension of externalism is to hold that if Oscar were stealthily transplanted to Slow Earth, not just his “water”-related concepts would slowly switch their contents, so would, e.g., his “hour”-related concepts. The question at the heart of my puzzle for the externalist is this: How long would slow switching take on Slow Earth? If everything is a hundred times slower on Slow Earth compared to non-slowed Twin Earth, then if slow switching takes a year on Twin Earth, it takes 100 years on Slow Earth (which is, of course, just one Slow Earth year).

However, as I shall argue, it raises certain problems for externalists to hold that even slow switching is slowed on Slow Earth. The core problem raised, I will argue, is that the externalist, in holding that slow switching slows on Slow Earth, is led to embrace a contradictory account of what the supervenience base is for wide-content temporal thoughts.

As I shall argue, the crucial distinction for motivating the externalism/internalism debate—the distinction between what is internal and what is external—is a distinction applicable to time and time-related content. My puzzle for the externalist concerns which properties determine the rate of slow switching, especially the slow switching of concepts of duration. I will argue that the externalist is committed to the contradiction that the properties determinative of the rate of slow switching both are and are not external properties.
The overview of the remainder of the paper is as follows: In section 2, I conduct the Slow Earth thought experiment. In section 3, I discuss some problems thereby raised in articulating what boundaries are truly relevant in disputes between externalists and internalists. In section 4, I sketch a problem for externalists, the Slow-switching Slowdown Showdown. This is a problem concerning Slow Earth rates of slow switching. In section 5, I consider objections and replies.

2. Slow Earth Preliminaries

2.1. Alternate Earths

Slow Earth is an analogue of the Twin Earth thought experiment wherein Earth and its counterpart differ mainly with respect to the passage of time. Every process takes longer on Slow Earth. Suppose that the slowdown is by a factor of 100: Slow Earth events take 100 times longer than Earth events. It seems that there is a perfect analogue to externalism about Twin Earth and XYZ that one can hold about Slow Earth: In virtue of this temporal difference, Slow Earthlings mean and think different things than Earthlings when they talk about and think about durations that they call “hour,” “day,” and “year.” Despite having nothing to do with differences across a spatial boundary, it seems fully worth calling “externalism” the position that Earthling Oscar’s intrinsically identical Slow Earth twin, Slow Oscar, thinks a different thought than Oscar when each thinks a thought expressible as “There are 24 hours in a day.”

Recall the typical externalist tale about twins. By “water” you mean water. But one day you go to Twin Earth, where the stuff that seems just like water and is called
“water” isn’t water at all. It is *twater*. By the way, you were transported to Twin Earth unawares, so your initial attempts to think and utter truths about that twater stuff are doomed to fail since you are really thinking about water. However, through the miracle of *slow switching*, after a while (days? weeks? years? Nobody knows) your attempts to think and utter truths about that twater stuff now succeed. By “water” you now mean twater and all of this was achieved without any differences except those involved in the mere passage of time. Thus, slow switching happens without you noticing: it has no subjective effect on you or anyone else. That’s the externalist story about Twin Earth. Let’s go to Slow Earth.

Slow Earth is the slowed version of Twin Earth. That is, Slow Earth is not just slower than Earth, it also differs in having XYZ in all the places that Earth has H₂O. Most, if not all, processes take 100 times longer on Slow Earth than on Twin Earth and Earth. The externalist to affirms that Oscar, if transported to Twin Earth, gets his “water”-related concepts slow switched. It seems natural for the externalist to also affirm that Oscar, if transported to Slow Earth, gets his duration concepts as well as his “water”-related concepts slow switched.

In case the reader has doubts that Twin Earth and Slow Earth are appropriately parallel for supporting externalism about time content, I offer the remarks in 2.2-2.4.

2.2. Slow Switching and Quick Switching

Whether it’s worth calling “externalist” the thesis that Slow Earthlings have different thought contents in virtue of the local slowness is intimately bound up with the question of how best to interpret the senses of “internal” and “external” relevant to the externalism
debates. The applicability of “internal” and “external” to the debate over externalism may further be illustrated in relation to discussions of slow switching. Many externalists follow Burge (1988, pp. 652-653) in affirming the possibility of a “slow switch” in which Oscar is moved to a new environment and stays long enough for the requisite causal interactions, or whatever, to give rise to a change in the content of Oscar’s thoughts without any differences being either perceptually or introspectively apparent to Oscar (Block, 1990; Gibbons, 2005; Ludlow, 1995). We may describe the slow switching of Oscar’s thought contents in terms of the supervenience of his changing contents on external changes regarding what he is causally related to.

Distinct externalisms (and distinct correlative internalisms) may be constructed for distinct kinds of concepts. It is typically an expression of externalism about natural-kind concepts to assert that Oscar and Twin Oscar have “water” thoughts with divergent contents. Another kind of externalism concerns indexical concepts. Unbeknownst to Oscar, we may transport him and thus alter the content of his “here” thoughts. The externalist position is that the actual place that Oscar is thinking of need not be manifest to Oscar. Oscar may, as in an example from Evans (1982, p. 201), be stealthily moved through the dark while thinking on several distinct occasions how hot it is in here and, unbeknownst to Oscar, be thinking of distinct locations. The stealthy movements may nonetheless be relatively quick and thus do indexicals, in contrast to natural kind concepts, admit of quick switching.

The phenomenon of stealthy switching, in both the quick and slow switches, helps point toward one plausible construal of the relevant internal/external distinction: What’s physically common to pre- and post-switch scenarios is internal, whereas what is
physically distinct is external. To further appreciate the significance of this construal in connection with Slow Earth, I turn to say more about temporal concepts.

2.3. Temporal Concepts

Many discussions of externalism focus on natural-kind concepts. However, another class of concepts for which an externalism/internalism debate can arise is the class of time concepts. Such concepts allow us to conceive of particular times (such as today, last year, 9:15am May 13, 2010), amounts of time (such as 50 milliseconds, a fortnight), and rates of change with respect to time (a snail’s pace, the speed of light).

For the purpose of discussing externalism about temporal concepts, it will be useful to sort them into two varieties: indexical/demonstrative varieties (now, yesterday, this time) and non-indexical/non-demonstrative varieties (a minute long, December 22, 1969).

One might hold a kind of externalism for demonstratives and indexicals about temporal concepts modelled on a plausible externalism for indexical/demonstrative concepts about objects and space.\(^4\) I and my spatially remote yet intrinsic doppelgänger express different thoughts by “this is an umbrella” uttered while demonstrating distinct though intrinsically similar umbrellas. It would be consistent with a kind of externalism to hold that on two distinct occasions in which I uttered “this is an umbrella” thoughts

\(^4\) For a useful overview of this version of externalism, especially as it figures in the work of Gareth Evans and John McDowell, see (Wikforss, 2008).
that were distinct with respect to content would be expressed on the distinct occasions if numerically distinct umbrellas were demonstrated.

The examples concerning umbrellas have thereby concerned objects, but similar remarks may be made about space. In virtue of our distinct locations, I and my twin express distinct thoughts by “here is a nice place for lunch” and I express different thoughts at different times by such utterances if my location changes between utterances.

We can relate the object and place examples to the notion of supervenience. In such examples we have a failure of narrow or internal supervenience. In both the object and place cases, there are differences between intrinsically identical individuals and changes without intrinsic changes across times for a single individual.

We can generate analogous failures of supervenience for indexicals and demonstratives involving times. Indexical examples involving different times include thoughts expressible by “Now the car is making a strange noise” and “Today is a good day for a picnic”. For a demonstrative example, there’s this: “This is when the cellos were supposed to start”. What’s externalist about this? We can hold fixed certain commonalities across doppelgängers or across times in a single individual while generating differences with regard to cognitive content. Thus does a plausible externalism arise for thoughts about times.

These examples have involved thought about times. Let us now consider thoughts about duration and amounts of time. Compare the spatial “This is how tall my daughter is” (said while holding my hand out) and the temporal “This is how long the song’s intro is” (said right before clapping my hands four times). Just as there’s a doppelgänger story
to tell in the height case resulting in different heights being attributed by the distinct doppelgängers, so is there a story to be told about durations.\(^5\)

### 2.4. Twinearthable slowswitchable nonindexical time concepts

The previous section ended on indexical/demonstrative examples. Let us now focus on nonindexical duration concepts, like those expressed by utterances like “The duration of the trip 1000 seconds” or “I boiled the egg for 3 minutes”.

It is possible for a philosopher to hold that nonindexical duration thoughts, for example, “minute” thoughts like *eggs are best when boiled for three minutes* have different contents on Earth and Slow Earth. Slow Earth’s main relevant difference from Earth (besides the thing about \(\text{H}_2\text{O}\) and XYZ) is that (pretty much) everything is slower relative to Earth. Conceiving of Slow Earth need not involve attempting to conceive of an entire possible world that is slower than ours. Such a world may not be coherently distinguishable from our own. The comparison between Earth and Slow Earth can, for present purposes, be thought of as a comparison between two situations in the same possible world. It is entirely compatible with contemporary relativistic physics to hold that there can be two different frames of reference wherein one is slowed relative to another.

One way of expressing externalism about temporal concepts is to say that temporal concepts are “Twin Earth-able”: Two beings may be alike with respect to the

---

\(^5\) For a highly instructive discussion of externalism and content, especially as concerns contents directed toward spatial properties of size and shape, see (Thompson, 2010).
way things appear to them and alike with respect to the relations between their use of the relevant concepts and the appearances connected with the uses, but nonetheless diverge with respect to what is thereby thought about in the deployment of their respective temporal concepts. And insofar as externalism may be held about such temporal concepts, so may it be held that temporal properties are external properties.

Let us grant for the moment that externalism for nonindexical temporal concepts is plausible. It then makes sense to ask whether they admit of switching, and, if so, whether the switching is quick switching or slow switching. I think a case can be made that there would be switching, and further that the switching would be slow switching. The distinction between the quick switchers and the slow switchers seems to map pretty neatly onto the distinction between indexicals and demonstratives on the one hand and nonindexicals and nondemonstratives on the other. Being nonindexical-nondemonstratives, duration concepts like “hour” can be expected to slow-switch after stealthy transplantations to Slow Earth.

I postpone further discussion of switching until section 4. I turn for now to discuss the relevance of spatially definable boundaries to our understanding to the internal/external contrast central to the externalism debates.

---

6 What, in general, serves to distinguish Twin-Earth-able from Non-Twin-Earth-able contents? This is far too big of a question to tackle here, but for useful recent discussions, see (Chalmers, 2006, 2008; Hawthorne, 2006; Kriegel, 2008; Thompson, 2010).
3. Beyond Space

Content externalists and internalists, disagreeing about how “wide” the supervenience base is of a person’s intentional mental states, often phrase the debate in terms of the head or the skin even though all parties are surely aware that it is beside the point to draw the boundary at exactly, for example, a person’s epidermis. No one would count it as a victory for externalism if it could be established that content supervened up to, but not beyond, an envelop of air extending a centimeter beyond a person’s skin.

How, then, can we get a grip on what talk here of “internal” and “external” amounts to? Unfortunately, I don’t have the answer, but it is my humble hope that the present paper can constitute some ground-level progress in the service of the eventual discovery of such an answer.

Perhaps one way to get a handle on the relevant internal/external distinction is to examine the motivating examples in the literature, examples such as the discussion of Twinearth and XYZ. As the standard Twin Earth thought experiments go, neither Earth in the 1750’s nor it’s contemporaneous Twin Earth counterpart contained any experts able to ascertain whether H$_2$O or XYZ flowed through the rivers and faucets. However, in virtue of distinct relations borne to H$_2$O and XYZ, respectively, Oscar and Twin Oscar entertain distinct contents when thinking the thoughts they would express by their respective “water” utterances. No differences between H$_2$O or XYZ would be manifest to Oscar if we presented him with a sample of each, but, according to the externalist, despite the difference between H$_2$O and XYZ being hidden, if a sample of XYZ were, unbeknownst to Oscar, suddenly transported to Earth and presented to Oscar, he would be thinking something false in thinking the thought expressed by his declaration that “this
is a sample of water”. For, despite its being hidden, H₂O is the wide content of the concept Oscar exercises in expressing thoughts with “water” utterances, just as XYZ is the wide content of Oscar’s deployment of “this.” “This is water” is just as false as “XYZ is H₂O” even though the falsehood of the former is not worn on its sleeve—it’s not as manifest to Oscar—as is the falsehood of the latter.

In the classic Twin Earth thought experiment, it is unclear whether the boundary between the internal and the external is some specific spatial boundary. It may perhaps be better to identify the external in the Twin Earth story with the properties differentiating Earth and Twin Earth and to identify the internal with the properties that Earth and Twin Earth have in common. It is open, then, that certain properties instantiated outside of the epidermis yet common to Earth and Twin Earth are properly thought of as “internal”. Superficial similarities between H₂O and XYZ, like liquidity and transparency, may properly be thought of as “internal” in this technical sense. As it stands currently, this is just a conjecture about what the internal/external distinction might amount to. This has not yet been a convincing reason for accepting that the internal/external distinction does not involve a spatially definable boundary. To get a convincing case against spatializing the internal/external, let us reflect on a different scenario than the standard Twin Earth case, namely, Slow Earth.

Whatever interplanetary differences lead to content differences in the Twin Earth thought experiment, they look to be the same sort as the interplanetary differences relevant to content differences in the Slow Earth thought experiment. However, as should be clear, what’s external to the subjects in the Slow Earth thought experiment is not something that can be sensibly construed as literally spatially outside of the skins or
skulls of the main characters. When transported to Slow Earth, processes literally inside of Oscar are just as slowed as processes outside of his body. Of course, in the Twin Earth thought experiment, the natural kinds are literally outside of the character’s bodies, but I think we should regard this as a contingent feature of the examples and not indicative of what really matters in determining the relevant sense of “external” in the externalism debates. Unfortunately, I will have to make do in the rest of the paper without supplying a full articulation of precisely what is relevant in using “external” and related terms.

With regard to the use of terms like “internal” and “external” I will proceed in the rest of the paper without an explicit definition of the internal/external distinction. But whatever the ultimate definition turns out to be, it is unlikely to involve an ordinary spatial sense of “internal” and “external”, but instead involve something applicable to, among other things, the crucial temporal similarities and differences between Earth and Slow Earth.

4. A Puzzle: The Slow-switching Slowdown Showdown

Here’s the puzzle. Suppose that slow switching takes a year on Twin Earth. How long will slow switching take on Slow Earth? My bet is that people that have the slow switching intuition will want to say that it takes 100 Earth/Twin Earth years. However, if something takes longer on Slow Earth, that seems to indicate that the properties it supervenes on are internal, not external, properties. There thus seems to be a tension: The tension at the heart of the slow switching intuition is that slow switching both does and doesn’t supervene on internal properties.
We can spell out the problem posed in terms of the following propositions.

1. (The Core Idea of Externalism, or Core): Oscar and Slow Oscar have divergent wide temporal contents, temporal contents that supervene on external properties.

2. (The Slow Switching Speedup Consequence, or Speedup): If Oscar is transported to Slow Earth, slow switching takes the same amount of objective time as would take place if he were transported to Twin Earth. This is because his wide temporal contents supervene on external properties. Slow switching is subjectively or manifestly sped up on Slow Earth compared to Twin Earth.

3. (The Slow Switching Slowdown Intuition, or Slowdown): If there is going to be slow switching, then if Oscar is transported to Slow Earth, slow switching takes objectively longer than it would on Slow Earth. Slow switching is subjectively or manifestly the same on Slow Earth as on Twin Earth. Wide temporal contents supervene on internal properties.

I take it as relatively clear that (1) is just the core idea of externalism as applied to temporal concepts. I don’t see that (1) requires further unpacking. Since the core problem arises due to the tension between (2) and (3), I turn to comment on them.

I take it that (2) is a direct consequence of (1). If contents diverge due to external properties, then, given the external temporal differences between Twin Earth and Slow Earth, slow switching would take the same amount of objective time on the two planets, and thus different amounts of subjective or manifest time.

The phrase in the formulation of (2), “Slow switching is subjectively or manifestly sped up on Slower Earth compared to Slow Earth” deserves further comment. I am not here trying to say that it would be noticed by Oscar that there’s a relative speed
up. There’s a difference in appearances, but not an apparent difference. Compare this to the following: Oscar sees a paint chip on one day. Days go by and he forgets about that paint chip. On another day, Oscar sees a darker paint chip. But having forgotten the first paint chip, the second chip doesn’t appear, to Oscar, to be darker than the previous chip. This is consistent with the appearance of the second chip being darker than the appearance of the first. There is a difference in appearance that is not an appearance of a difference.

I take it that (3) is highly intuitive. We may speculate that the intuition is of a kind with the intuition that there would be switching as well as with the intuition that any switching would be slow. It seems natural that, like any processes that take time, slow switching is a process that takes more time on Slow Earth.

There looks to be a pretty clear conflict between (2) and (3), disagreeing as they do on whether temporal contents supervene on external or internal properties. It should perhaps be spelled out that saying that something supervenes on external properties should be regarded as shorthand for “external as well as internal properties”. Consider externalism regarding H$_2$O. On the externalist story, a thought’s having a certain content doesn’t supervene solely on H$_2$O, but on H$_2$O as well as on brain events (and perhaps much else besides). The point still stands, however, that there’s a tension between (2) and (3), and setting aside the short-hand expressions, the tension may be stated as a tension between saying that temporal contents supervene on only internal properties (internalism) or internal properties and external properties (externalism).
5. Objections and replies

5.1. Impossible?

Perhaps the externalist wishes to avoid the puzzle of the Showdown by dismissing (the slowness of) Slow Earth as an impossibility. This would be an odd move to make in a subdiscipline of philosophy of mind so dependent on taking Twin Earth seriously. We have perhaps more scientific evidence for slowed scenarios than for H₂O/XYZ scenarios.

There are two relatively noncontroversial ways to motivate the claim that Slow Earth is not only possible, but is consistent with the laws of nature operative in the actual world. The first way appeals to relativistic physics. According to relativistic physics, events in accelerating and gravitational reference frames are slowed relative to events outside such frames.

The second way of motivating the nomological possibility of Slow Earth appeals to assumptions concerning the relation between actual and artificial intelligence. If actual intelligence is just a certain kind of computational process, then an artificial intelligence can be a psychological duplicate of an actual person. Further, the AI duplicate can be run in a virtual reality (VR) duplicate of the real environment wherein the speed of the computer simulation is slowed-down relative to the real-world scenario that it duplicates.⁷

---

⁷ Readers of (Egan, 1994) will be treated in the early pages to a phenomenological thought experiment wherein an upload—an AI replica of a human consciousness—is implemented via multiple schemes varying in the objective temporal relations of the underlying computational processes. Such objective variations are unaccompanied by any differences in the upload’s subjective time experiences.
One version of the AI/VR adaptation can have Oscar be a robot in the first place and stealthy switches to and from VR Slow Earth accomplished by the uploading and downloading of his software-based consciousness between the hardware of his robot body and the hardware of the VR computer. The VR/AI version of Slow Earth is currently more controversial than the version dependent on relativistic physics, but it nonetheless enjoys the support of many philosophers and scientists.\(^8\)

It should be noted that the slowed scenarios hypothesized need not involve entire planets. So what’s accelerated or simulated can be some tractable sub-chunk of the whole planet. Nothing as large as the whole of the Earth need be slowed for the thought experiment to go through. While “slowed situation” might be a more accurate label for the hypothesis under consideration, I’ll stick with the “Slow Earth” moniker. The label “Slow Earth” is appealing for highlighting continuity with the literature concerning Twin Earth.

5.2. Illicit assumptions about mind and time?

Perhaps an externalist will want to resist the Showdown puzzle by accusing me of making illicit assumptions, especially as concern mind and time. Am I making illicit assumptions about the relevant relations between mind and reality, especially as concerns temporal thought and experience? I don’t think so. I do make certain assumptions, but I don’t see that there’s anything objectionable about them.

\(^8\) Of course, adjustments will need to be made to adapt points about XYZ to the VR case.
I assume the following. If Oscar’s environmental events were sped up without a synchronized speed up of Oscar’s internal processes, then given fast enough differences, there’s no special problem involved in presuming that events would seem sped up to Oscar. There might of course be other problems: Oscar is asleep, or hallucinating, or not paying attention. But these aren’t special problems. They aren’t special to the thought experiment. There is no special problem in supposing that, if external events were sped up relative to Oscar’s internal processes, then things would seem faster to Oscar.

The same apparent effect would be achieved by slowing things down inside of Oscar relative to his external environment. Indeed, given certain highly plausible assumptions, the difference between speeding up Oscar’s external environment and slowing down Oscar’s internal processes may not amount to any apparent difference at all: As far as things seem to Oscar, things will seem faster than prior to altering the relation between internal and external events.

One crucial way of guaranteeing that Oscar won’t notice any speedup in his environment is to speedup his internal processes in synch with the external speedup. Similarly, one crucial way of guaranteeing that Oscar won’t notice any slowdown of his internal processes is by slowing down his external environment in synch with his internal processes. Slowing down Oscar’s external environment in synch with an internal slowdown will result in placing Oscar in a situation that I am here calling Slow Earth. I don’t see that any of these assumptions are especially objectionable.
5.3. The Interaction Theory of Slow Switching

In this section I want to examine a possible move for the externalist in responding to the Showdown. Such a move, if successful, will allow the externalist to hold both Core and Slowdown while rejecting Speedup. A key component of this move is to give an explanation of how slow switching works in such a way that would block the inference from Core to Speedup. More specifically, the explanation, what I will call the Interaction Theory of Slow Switching or just the Interaction Theory, blocks the inference to Speedup by offering that what determines rate of slow switching is the number of causal interactions, and not the objective time that it takes for the number of interactions to take place.9

One way to begin to appreciate the appeal of the Interaction Theory is in terms of the slow switching of “water” contents. Suppose, first, what would happen if Oscar, a native of Earth, is transported to Twin Earth, but while there, is kept in causal isolation from XYZ. What I mean by causal isolation here is this: Let us suppose that Oscar neither causally interacts with XYZ himself, nor reads a book by or has a conversation with anyone who themselves have causally interacted with XYZ. Let us suppose that there is no causal chain leading from any sample of XYZ to any utterance or state of mind of Oscar’s. It seems natural to suppose, then, that despite being on Twin Earth, with XYZ only a short distance from Oscar’s isolation chamber, Oscar’s “water” thoughts and utterances will never undergo the slow switch from bearing H2O contents to bearing XYZ

9 I am grateful for discussions with Jason Zarri and Chase Wrenn who offered the sort of line that I am here calling the Interaction Theory.
contents. What he lacks are the requisite causal interactions. Further, if released from the chamber and allowed to begin interacting with XYZ and people and texts connected to XYZ, it will take more than a single interaction to secure new contents for Oscar’s “water” thoughts. No one, of course, has any clue how many interactions are required, but this is no more problematic than no one knowing how many grains make a heap. More than one are required and there is a process of accumulation that takes time. However, time is not of the essence. What is of the essence is what’s accumulated. What’s accumulated are a number of interactions, not an amount of time in which they take place.

The Interaction Theory allows the externalist to embrace Slowdown. There are different amounts of objective time it takes to accumulate the requisite interactions for slow switching to take place on a Twin Earth and a Slow Earth.

Before discussing the application of the Interaction Theory to temporal concepts, I want to raise some problems that arise for “water.” Despite the external properties that distinguish them, H₂O and XYZ share many of the same causally efficacious properties. Both are liquid at the same temperatures and pressures. Both are transparent. And so on. It is such common causally efficacious properties that accounts for their indistinguishability to the untutored observer. Why not hold, then, that it is only these common properties that enter into the supervenience bases of the respective “water” thoughts of Earthlings and Twin Earthlings? Why hold that the supervenience bases also include internal properties, properties that differentiate H₂O and XYZ? Without answers to such questions, the externalist looks to be in a poor position to defend themselves against the following problem. If external chemical properties matter for the content of
“water” thoughts, then why don’t external *temporal* properties matter for the rate of slow switching?

The worry that arises for the Interaction Theory is that its proponents are in need of non-question-begging arguments for supposing that external properties matter for “water” contents, but not for rate of slow switching. To appreciate further problems that arise for the Interaction Theory, I turn to examine how the theory handles the slow switching of temporal concepts.

It turns out that the Interaction Theory runs into big problems in trying to account for temporal concepts and their switching rates. One big problem with the interaction theory is that it is not at all clear how it is supposed to apply to time, since there seems to be little sense in saying that something *causally interacts* with time. Neither specific times, nor specific amounts of time seem to be candidate causal relata. To illustrate: There might be a causal difference between having water drip on a rock for twenty days versus twenty years, but the causal difference is due to the differing amounts of mass falling upon the rock, not the mere differences in duration. Given the inefficacy of time considered in and of itself, there’s no possibility of interacting with it in the way that would seem to be required by the interaction theory.

I suppose that the way to think of extending Interaction Theory to temporal concepts is in the following manner. Oscar is sent to Slow Earth. Initially, his temporal concepts have their old contents, so that when Oscar says, while frying an egg on Slow Earth, *this will take three minutes*, he says something false, since it will actually take 300 minutes to fry a Slow Earth egg. Eventually, however, Oscar’s conceptual contents complete the slow switch. Thus, when Oscar next says, while frying an egg, *this will take*
three minutes, he says something true. According to Interaction Theory, the time it takes for the slow switch is determined by how much time it takes for some number, \( n \), of causal interactions to take place. If Oscar had instead been transported to Slower Earth, it would take longer than on Slow Earth for \( n \) interactions to take place. So, Interaction Theory delivers Slowdown even for temporal concepts.

But it looks like we can raise the same sort of concern as raised earlier, but perhaps in a way that is even more acute. What non-question-begging reason can the externalist give for holding that the contents of temporal concepts supervene on external properties like objective duration while the rate of slow switching of temporal concepts supervenes on internal properties like number of causal interactions? If the rate of slow switching ultimately supervenes on internal properties like number of interactions, why isn’t this what the contents of temporal concepts supervene on as well?

5.4. Non-interaction use theory

Given the sorts of problems raised for the interaction theory, the externalist might want to take a different approach. I turn now to examine a different strategy for the externalist to hold onto Slowdown and reject Speedup. Consider what I shall call a “non-interaction use theory”. On this theory, the number of uses the concept has been put to is what determines both (1) whether slow switching occurs for a slow-switchable and (2) the rate of switch. A use of a concept is an application of that concept in thought. Suppose it takes 80 uses to effect a complete switch to a new content. Whatever amount of time it takes on nonslowed Twin Earth for transplanted Oscar to complete the requisite series of 80 uses, it would take a hundred times longer than that if Oscar were
transplanted instead to Slow Earth. This then is how the non-interaction use theory allows the externalist to embrace Slowdown and reject Speedup.

One objection that was raised against the interaction theory, namely that time is not the sort of thing that can be interacted with, has no force against the non-interaction use theory. By not depending on interaction, it is immune to this objection. The nonreliance on interaction is the noninteraction theory’s greatest strength. Unfortunately, it is also its greatest weakness. A point that may be raised as an objection to the non-interaction use theory is a point that was used to motivate the interaction theory. Intuitively, mere number of uses seem insufficient to effect a content switch. This might be best brought out in contemplation of H₂O/XYZ switches. Suppose Oscar were transported to Twin Earth but kept in a chamber that kept him entirely causally isolated from XYZ. He has neither direct interaction with XYZ samples, nor interaction with anyone who themselves constitute links in a causal chain leading to XYZ samples. Transplanted Oscar, confined to his chamber, could use his water concept 80 times or 800 times, but mere proximity to XYZ without any causal connection to it seems insufficient for any of number of uses to give rise to a content switch.

6. Concluding remarks

The externalist’s appeal to causation, especially in articulating the Interaction Theory, belies an intuition that what matters to content has to matter, that the determinative differences have to make a difference. With respect to “water” thoughts, at least, sending Oscar to Twin Earth in a causally isolated chamber wouldn’t result in slow switching no
matter how long that chamber was on Twin Earth. The mere presence of XYZ in the nearby vicinity just wouldn’t matter.

I think intuitions about what matters underlie the superior plausibility of **Slowdown** over **Speedup**. I think however, that such intuitions also serve as a basis for the ultimate downfall of **Core**, at least as applies to temporal contents. If what governs our intuition about how long a process takes is the number of causal interactions, then the temptation becomes very strong to identify duration itself with the number of interactions. But since number of interactions is an internal property instead of an external property, such a move is to embrace internalism. To make such a move, then, is to abandon **Core**.

While I am inclined to think that the upshot of contemplation of the Showdown favors internalism, at least about duration contents, I am also inclined to think that the surface has barely been scratched here and much more needs to be done to take us beyond these preliminary investigations of Slow Earth. At the least, the parallels between the Twin Earth and Slow Earth thought experiments serve to raise interesting puzzles that merit further investigation. Such puzzles concern what really matters in drawing a distinction between the internal and the external and the true nature of our ability to think about amounts of time.

**Acknowledgements**

For comments on earlier versions, I thank Shawn Akbar, Jared Blank, Nathanial Blower, David Chalmers, Justin Fisher, Robert Howell, Michal Klincewicz, Pete LeGrant, Harry Reeder, Ken Williford, Chase Wrenn, Jason Zarri, and the audience of my July 2010 talk.
at the University of Texas, Arlington Summer Seminar on Mind, Cognition, and Neuroethics.

References


