**Modelling Temporal Assertions for Global Directional Eliminativists**

**Abstract**

Global directional eliminativists deny that there is any global direction to time. This paper provides a way to understand everyday temporal assertions—assertions made outside the physics or metaphysics rooms, the truth of which appears to require that time has a global direction—on the assumption that global directional eliminativism is true.

**Keywords:** B-theory; C-theory; Direction of Time; Error Theory

# **1 Introduction**

Distinguish two views: global directional realism and global directional eliminativism. The former is the view that actually, time has a global direction (where there is *global* direction just in case there is a single temporal arrow, and hence time has the same direction at every location) the latter is the view that actually, time does not have a global direction. There are numerous varieties of each view. Global directional realism encompasses various A-theoretic models of time, on which there is robust temporal passage (i.e. there is a single moment that is objectively present, and which moment that is, changes). On such views, the global direction of time is grounded in the direction of temporal passage.[[1]](#footnote-1)

However, not all global directional realists are A-theorists. There are B-theorists who deny that there is any robust temporal passage yet are nonetheless global directional realists because they suppose that there exists a primitive or fundamental direction to time (Maudlin ([2007](#_ENREF_22)); Oaklander ([2012](#_ENREF_26)); Tegtmeier ([2009](#_ENREF_33), [2016](#_ENREF_34)); [Kajimoto, Miller, and Norton (2020)](#_ENREF_16)). Moreover, there are *global reductionists* who think that the global direction of time reduces to (or is grounded by, or supervenes on) some more fundamental phenomena. These more fundamental phenomena might be causal relations (Mellor ([1998](#_ENREF_24)); Le Poidevin ([1991](#_ENREF_18))), or the entropy gradient alongside a law-like boundary condition (Loewer ([2007](#_ENREF_19)); Albert ([2000](#_ENREF_1))).

Contrast global directional realism with global directional eliminativism. There are two ways of being a global directional eliminativist. One way is to be a directional eliminativist *simpliciter:* this is someone who thinks that time has no direction at all, and *a fortiori* has no global direction. We will call this view *directional eliminativism.* Here we have in mind those who endorse a version of the block universe theory on which there is no temporal arrow built into the block: if the block has two temporal boundaries, then there is no sense in which one of them is really the *first* moment, and one really the *last* moment (Price ([1996](#_ENREF_27), [2007](#_ENREF_28))).[[2]](#footnote-2) One way of spelling out the directional eliminativist position is as a version of the C-theory. On that view C-relations (*undirected,* asymmetric, transitive ordering relations[[3]](#footnote-3)) are both necessary and sufficient for the existence of time (Farr ([2012](#_ENREF_10), [2018](#_ENREF_11))).[[4]](#footnote-4) This distinguishes them from B-relations, which are *directed*, asymmetric, transitive ordering relations of earlier-than, later-than and simultaneous-with.

However, one need not be a directional eliminativist in order to be a *global* directional eliminativist. Another way to be a global directional eliminativist is to be a directional realist, yet reject the claim that there is any single global direction to time. On this view the direction of time reduces to some more fundamental phenomena, but the reduction is local.[[5]](#footnote-5) Hence it is always a local matter, rather than a global one, what direction time has, and hence time can have different directions at different locations. We will call this view *local reductionism*, for obvious reasons.[[6]](#footnote-6)

In this paper we explore how global directional eliminativists ought make sense of everyday temporal assertions. We take assertions to be utterances that express truth-apt propositions. Everyday temporal assertions are assertions which appear to be true only if there is a global temporal direction. We begin, in §2, by motivating this project and spelling out the explanatory picture shared by both these versions of global directional eliminativism. §3 identifies some features of agents’ deliberative psychologies, which Price ([2007](#_ENREF_28)) uses as a basis for his semantics for causal assertions and which we develop into a realist semantics for everyday directional assertions. We outline a contextualist (§4), and relativist (§5) semantics. While we think there are reasons to prefer relativism, our primary conclusion is that one need not think there is global temporal direction in order to make sense of everyday temporal assertions.

# **2 Motivating Global Directional Eliminativism**

It is not our aim to argue that global directional eliminativism, in either of its forms, is true. Nevertheless, it is worth briefly outlining the motivation for adopting the view, and the accompanying ontological picture. We think this picture is a plausible one, and we will appeal to it in developing ways to model everyday temporal assertions conditional on global direction eliminativism being true.

First, then, we can notice that if there were indeed robust temporal passage, this would provide a global direction to time. But we have good reason to suppose there to be no such passage.[[7]](#footnote-7) Given this, the only remaining options for the global directional realist are that global direction and primitive, or that is reducible. Both options face problems.

Consider, first, why it is that we are inclined to say that time has a direction. We are so inclined because the processes we see around us are temporally asymmetric: they appear to be directed. Eggs go from being raw to cooked, but not *vice versa*; objects age, but do not ‘youthen’; we gain new memories of what we take to be the past, but do not gain memories of what we take to be the future, and so on. It quite naturally seems to us as though time has a direction, which points from the boundary we call the big bang (the past) to the opposite boundary (if there is one) in the future, so that the current time bears traces from past times (such as memories) but no traces from future times. Crucially then, we want an account of temporal direction to be one on which time’s having the direction it does, explains its seeming to us as though time has the direction it does.

Then consider our first option, on which time’s direction is primitive. That view faces a problem because is consistent with our laws of nature that we can run macro physical processes in a time-reversed manner and that reversal not be counter-nomic. This suggests that there is a nomically possible world that is just like our world with respect to the distribution of physical properties and processes, except that the primitive temporal arrow points in the *opposite* direction to the direction it actually points. But then it’s hard to see how the presence of temporal direction in our world explains its seeming to us as though time has a direction, since things would seem the same in the other world, despite the fact that time’s direction would be reversed.

Reductionism about temporal direction appears more promising in this regard. Versions of reductionism typically aim to reduce the direction of time to the presence of some asymmetric phenomenon, or process, within time. On any such view if we duplicate the relevant asymmetric phenomenon, or process, we thereby duplicate the direction of time. One common suggestion is that we reduce time’s direction to the direction in which entropy increases (Loewer ([2012](#_ENREF_20)) Albert ([2000](#_ENREF_1)) and Kutach ([2007](#_ENREF_17))). Reductionist views such as this, however, also face a problem: namely, that there is no reason to suppose that the relevant phenomenon, or process—in this case increasing entropy—is globally asymmetric. Consider entropy. Around here, entropy tends to increase. That is because there is a very low entropy boundary condition (the big bang), and entropy is still increasing away from that low entropy state. But it is consistent with the laws of nature that at the other end of our universe there is *another* boundary with very low entropy, a kind of mirror image of the low entropy boundary near us: call it the big crunch. If that were so, then we know that entropy will tend to *decrease* towards that boundary.

So if the direction of time reduces to the direction towards which entropy increases, the temporal arrow in our half of the universe points towards the big crunch, but at the other end of the universe the temporal arrow points *away* *from* the big crunch. If so, there is no global direction to time, but instead, two local directions.

Importantly, even if we came up with some reason to think that in a world with both a big bang and a big crunch there would still be a global direction to time, we run into the same sorts of worries facing the primitivist. Suppose that in fact the temporal arrow points away from the big bang towards the big crunch. Still, at the other end of the universe there are people (let us suppose) for whom it appears as though time points in the opposite direction. After all, things appear, at the other end of the universe, much as they appear here: physical processes are temporally asymmetric at that end of the universe. But at that end of the universe physical processes ‘point’ in the opposite direction to the direction in which they point at our end of the universe. Hence at that end of the universe, it will seem as though time’s arrow points in the opposite direction to the direction in which it appears to point at our end of the universe. But then what is doing all the work in explaining why, at any particular location, time seems to have the direction it does, is the presence of the various *local* asymmetries. So although time has a global direction, its seeming to have that direction is entirely explained by the presence of local asymmetries. Further, time’s having that global direction entirely *fails* to explain why at the other end of the universe time seems to have the opposite direction to the one it in fact has: that, in turn is also explained by the local asymmetries.

These sorts of considerations motivate global directional eliminativism. One might conclude that some kind of local reductionism is true. Time has no global direction, but it has different local directions at different locations. Alternatively, one might conclude that time has no direction—but that nevertheless we can explain its *seeming* to have a direction, at some location, by appealing to local asymmetries at that location—and thus embrace directional eliminativism.

In this regard, both the local reductionist and directional eliminativist can agree about how things are, fundamentally; both agree that there is no temporal passage, no primitive directional properties, and no reductive base that yields a global temporal direction. Both accept that the appearance *as of* there being temporal direction, at a location, is *explained by* some local asymmetries—such as, but perhaps not exhausted by, a local entropy gradient. The substantial difference is that the local reductionist says that the presence of these local asymmetries constitutes, or grounds, there being a local direction to time, while the directional eliminativist says that the presence of those local asymmetries merely explains why it looks as though there is such a direction at those locations. This will become important in what follows, since it is these local asymmetries to which we will appeal in providing a model of everyday temporal assertions.

With this picture in place, we can explain why the apparent truth of everyday temporal assertions presents a problem for the global directional eliminativist. Many such assertions seem to be true only if there is a global direction to time. When we ordinarily make temporal assertions about what is past, what is future, which events occur before which, etc., plausibly, we take ourselves to be making assertions about a single correct global direction of time. We assume that there is a fact of the matter as to which temporal boundary really is first, and which last. If the truth-conditions for everyday temporal assertions mention there being a single global direction to time, then the global directional eliminativist will end up saying that a good deal of our temporal discourse is false (or at least, not true). This paper shows how the global directional eliminativist need not pay that cost.

In order to do so, in what follows we outline and evaluate several ways—congenial to the ontological commitments of the global directional eliminativist—of modelling the semantics of everyday temporal assertions, each of which vindicates the truth of those assertions. These proposals appeal only to C-relations, and to agents’ deliberative psychology. The reason we appeal to these features rather than to, say, the entropic gradient at a region, is that it is controversial exactly which phenomena jointly, or singly, ground the local direction (for the local reductionist) or explain the apparent local direction (for the directional eliminativist) of time. We don’t want to take a stand on this issue.

Instead, we make the following assumption: whatever the fundamental underlying local reductive base, or fundamental explanation for the appearance of direction at a location, the existence of that thing will be correlated with the appearance as of time having a particular direction at a particular location. (After all, one is supposed to explain the other.) In turn, we will assume that higher-level asymmetries with which we are all familiar, most notably the asymmetry of deliberation at a location, is appropriately connected with whatever it is that grounds, or explains, the appearance of direction at that location. This will enable us to provide truth-conditions for everyday temporal assertions which are neutral regarding what it is that grounds, or explains, the appearance of direction at a location, whilst still saying something substantive that makes plausible that these are the correct truth-conditions.

# **3 Attitudes and Everyday Directional Assertions**

In this section, we offer a general story about the role that everyday directional assertions play, following Price ([2007](#_ENREF_28)). Later sections will use this story to motivate the idea that everyday temporal assertions do not require global direction in order to be true.

Let us begin by supposing that it is person-*phases* that are the locus of beliefs, deliberation, and value judgments. Here, we use person-phases as a term that is neutral between picking out temporal stages of perduring persons, or picking out enduring persons at times.[[8]](#footnote-8) In either case, it is person-phases who judge that vegemite is tasty, who regret getting a tattoo, who anticipate chocolate ice-cream, and who deliberate about whether to eat frogs’ legs.

Let us call a person-phase that is the locus of deliberation, *a deliberator*. Following Price ([2007](#_ENREF_28)), say that the alternatives from which a deliberator chooses are her OPTIONS. The propositions in OPTIONS are those towards which the deliberator has a particular kind of attitude. Namely, she takes herself to be able to make these propositions true. So, for instance, suppose I am deliberating about whether to have cornflakes, toast, or weet-bix for breakfast tomorrow. The proposition that I eat cornflakes for breakfast and the proposition that I eat weet-bix for breakfast are both in my set of OPTIONS, since I take it that I can bring about the truth of either of these propositions.

By contrast, FIXTURES pick out all of the matters of fact not in OPTIONS. FIXTURES contain both the KNOWNS—those facts the deliberator takes herself to know—and the KNOWABLES—those matters she regards as at least in principle knowable before any choice is made. So, for instance, the proposition that I ate porridge for breakfast on 22 December 2018, is a proposition I take to be in KNOWNS. The proposition that I ate porridge on 22 December 1998 is a proposition I take to be knowable, even though I do not, in fact, know it.

As Price notes, a deliberator cannot treat a matter as something to be decided by the deliberative process whilst taking it as either known or knowable prior to the deliberative process. So a deliberator must carve the world so that some propositions are in OPTIONS. Equally, she must carve the world so that some propositions are in FIXTURES since deliberation requires taking *some* things about the world to be known: otherwise it is hard to see how one could have any views about the connection between actions and consequences. Thus, in order to deliberate at all, deliberators *must* carve up the world into FIXTURES and OPTIONS.

Moreover, the attitudes that deliberators bear to the propositions in FIXTURES and OPTIONS are different. Plausibly, propositions in FIXTURES will be ones towards which actual deliberators have certain emotive attitudes such as regret, pride, nostalgia, and so on. By contrast, those propositions in OPTIONS are the ones towards which deliberators have emotive attitudes such as anticipation, fear, anxiety, and so on.

In addition to these emotive attitudes there are also evaluative attitudes. Suhler & Callender ([2012](#_ENREF_32)) distinguish two evaluative asymmetries, whereby we tend to direct different evaluative attitudes towards ‘future’ and ‘past’ events (henceforth we will use scare quotes around terms such as these which appear in everyday directional assertions but for which we have not yet given truth-conditions). First, we tend to prefer distant ‘future’ pain to proximal ‘future’ pain and to prefer proximal ‘future’ pleasure to distant ‘future’ pleasure. This is widely known as ‘*future’* *discounting*.[[9]](#footnote-9) Second, we prefer that disvalued states are ‘past’, and valued states are ‘future’, even when this makes no other difference to the respect in which that state is valued or disvalued.[[10]](#footnote-10) Suhler & Callender ([2012](#_ENREF_32)) call this the *temporal value asymmetry*.[[11]](#footnote-11)

The global directional realist will explain agents’ partitioning of the world into FIXTURES and OPTIONS, and explain the temporal value asymmetry, in terms of underlying facts about the single, global, direction of time. However, we see no reason to think that this partitioning can *only* occur when there is a global fact as to which direction along the temporal axis is past, and which future. For simplicity, in what follows let’s imagine that we assign numbers to temporal locations so as to create a Cartesian coordinate system along the temporal axis. Call the ‘direction’ along the axis wherein the numbers increase in magnitude, the *positive gradient*, and the ‘direction’ along the axis wherein the numbers decrease in magnitude, the *negative gradient*. Since the coordinate system is conventional, which gradient is positive and which is negative is arbitrary: it merely affords us a naming convention. Global directional realists think there is a single, global, fact of the matter as to which of these gradients aligns with the temporal arrow.

Global directional eliminativists deny this. Nevertheless, they can suppose that at any particular location in space-time, deliberators will partition the world in this way in part on the basis of whatever particular local asymmetries of matters of fact, such as local entropic asymmetries, they take to ground, or explain, the appearance of temporal direction.

In other words, it might be that relative to some temporal locations and some psychologies, certain ways deliberators might partition propositions into FIXTURES and OPTIONS are better than others, and this need not reflect there being any single, global, direction to time.

The following general picture will provide the basis for our accounts of the truth-conditions for everyday temporal assertions, and in particular, those subset of temporal assertions that seem most pressing to global temporal direction: we call these *directional assertions.*

There is a positive gradient and a negative gradient. Relative to deliberators at some location, who partition the world into FIXTURES and OPTIONS, one of those gradients goes *from* FIXTURES, *to* OPTIONS, and the other goes *from* OPTIONS, *to* FIXTURES. For these deliberators, the ‘future direction’ *just is* the gradient that runs from FIXTURES to OPTIONS, and the ‘past direction’ *just is* the gradient that runs from OPTIONS to FIXTURES.

What though, is it for a gradient to run *from* FIXTURES *to* OPTIONS? We will say that *for a deliberator, d*, the positive gradient *runs from* FIXTURES, *to* OPTIONS, iff, in general, *d* takes the constituent events, objects, and properties of the propositions in OPTIONS to be such that those events, objects and properties are associated with higher numbers than are the events, objects and properties that are the constituents of the propositions in FIXTURES. Likewise, *mutatis mutandis*, for the negative gradient.

Notice, then, that this use of OPTIONS and FIXTURES does not require that the partitioning of propositions into these sets is exhaustive.[[12]](#footnote-12) Consider the proposition <at t\*, Jupiter collides with the sun>. Let us suppose that this proposition is not in FIXTURES for *d:* *d* does not take it to be either known or knowable. Equally though, it’s not in OPTIONS either. d does not suppose that she can deliberate about whether Jupiter collides with the sun at t\*, since she does not take herself to have any control over Jupiter’s path.

For our purposes, however, this does not matter. Our aim, in appealing to OPTIONS and FIXTURES, is to provide a principled way to decide, relative to a deliberator, which direction along the temporal axis is past, and which future. That there are propositions about events located along the temporal axis which are not in either FIXTURES or OPTIONS does not matter, so long as our deliberator is such that we can classify propositions in OPTIONS and in FIXTURES to thereby determine which direction along the temporal axis contains the constituent events, objects, and properties of the propositions in OPTIONS, and which direction contains the constituent events, objects, and properties of the propositions in FIXTURES.

The picture we have in mind is best represented via a diagram. In figure 1, Freddie partitions the world into OPTIONS and FIXTURES such that the positive gradient runs from FIXTURES to OPTIONS and the negative gradient runs from OPTIONS to FIXTURES. By contrast, given the manner in which Annie partitions the world into FIXTURES and OPTIONS, for Annie the positive gradient runs from OPTIONS to FIXTURES, and the negative gradient runs from FIXTURES to OPTIONS.



As figure 1 illustrates, different deliberators can disagree about which gradient runs from FIXTURES to OPTIONS. Such disagreement comes in different forms, depending on whether the disagreement stems from psychological differences between deliberators, or differences in the deliberators’ respective local environments. Let us call a disagreement a *merely locative disagreement* iff despite using the same psychological procedures, deliberators disagree about which gradient runs from FIXTURES to OPTIONS in virtue of differences in their local environment. By contrast, a disagreement is a *merely psychological disagreement* iff despite being in the same local environment,[[13]](#footnote-13) deliberatorsdisagree about which gradient runs from FIXTURES to OPTIONS in virtue of differences between the psychological procedures they use to partition the world.

One disagreement between local reductionists and directional eliminativists is that the former might deny there are any merely psychological disagreements, while the latter might countenance some such disagreements. Price (2007), for instance, seems to allow that there could be merely psychological disagreements. At the very least, he certainly thinks there could be disagreements which are not merely locative disagreements, but which, at least in part, stem from psychological differences. By contrast, local reductionists might deny this, since they might hold that the relevant reductive base for local direction involves only certain asymmetries of things in time (whatever they might be) and does not involve psychological properties which are not themselves also explained by those same more fundamental asymmetries.[[14]](#footnote-14) Of course, this need be no part of local reductionism—the reductionist can identify whatever reductive base she thinks appropriate—but it is worth noting, here, a potential difference between the two views. In either case, our view is going to be able to accommodate the presence, or absence, of merely psychological disagreements.

We think the global directional eliminativist who thinks that *something* like the story we have just told is correct, ought hold that the truth or falsity of everyday directional assertions is sensitive to the psychological and locative context of speakers who utter those assertions and, perhaps, also of those who assess the truth of those assertions. That’s because it seems plausible that what makes such assertions true must be something about the psychological make-up and procedures used by speakers (and perhaps assessors of speech) in partitioning the world into OPTIONS and FIXTURES, and something about the local features of the world itself, which makes some such partitions better than others.

Two questions then arise. If we suppose there can be merely locative and merely psychological disagreements, do parties to merely locative and merely psychological disagreements *mean* the same thing when they utter assertions such as ‘Direction D is future’: do they express the same *content?* Second, can expressions such as ‘Direction D is future’ uttered in different contexts (locative or psychological) have a different truth-value: does the context determine truth-conditions for the assertion such that it is true in some contexts, and false in others? One’s answers to these questions will make some of our proposals more appealing than others. In what follows we outline three different approaches that presuppose something like the broad story we just told.

# **4 Contextualism**

Let’s say, following McFarlane ([2009](#_ENREF_21)), that an expression is indexical iff its *content* at a context depends on features of the context, and that an expression is context-sensitive iff its *truth-value* at a context depends on features of the context. Consider an utterance of ‘it is raining’ made at a time *t*, in a world *w*, by an individual *i*. One might hold that the utterance expresses the proposition <it is raining at w, t, i>, which is true just in case it is raining at that centred world—i.e. at w, t, i. That would be to think that there are ‘hidden’ parameters (times, worlds and individuals) which are filled in by the context of utterance and which determine the content of what is expressed. On this view, what context does is fill in these hidden parameters and, by so doing, determine the content expressed. Such a view is often known as *indexical contextualism.*

Most of us are indexical contextualists about some expressions. In the case of indexicals such as ‘I’, most of us think that the content expressed varies between contexts (depending on who the speaker is). We will say that one is an indexical contextualist about everyday directional assertions just in case one holds that the only role context ever plays is to fill out the content of what is expressed by an everyday directional assertion at a <world, time, individual> triple (vis-à-vis semantics; of course, context might well play other roles vis-à-vis pragmatics).

By contrast, one is a *non-indexical contextualist* about some type of expression if one holds that expressions of that type express the same content at every context, but that the proposition thus expressed takes truth-values relative to contexts. For instance, one might hold that an utterance of ‘it is raining’ simply expresses the proposition <it is raining>, and that that proposition is true at a context just in case at that context it is raining. Then non-indexical contextualism about everyday directional expressions is the view that context determines the truth-value of everyday directional expressions without determining their content.

We suggested, in §3, that the global directional eliminativist should hold that the truth or falsity of everyday directional assertions is sensitive to the psychological and locative context of those who utter them. These hidden parameters will arbitrate whether an everyday directional assertion made in a context is true, either by modifying the content of what is said (as per indexical contextualism) or by determining how what is said maps to a truth-value (non-indexical contextualism).

To get a feel for the distinction, and for how each of those proposals might go, let’s begin by considering an indexical contextualist semantics for some key everyday directional assertions before turning to a non-indexical proposal.

## **4.1 Indexical Contextualism**

Let’s call the relevant aspect of an individual’s psychology—namely how she partitions the world into OPTIONS and FIXTURES—her *deliberative psychology*. Then the indexical contextualist will likely think that not only does the hidden individual parameter that is filled in by context tell us where the relevant individual is, in the world, (and hence tell us about her local environment) but also, it tells us about her deliberative psychology. According to indexical contextualism, when speakers engage in everyday directional talk they are always expressing propositions whose content includes something about their own deliberative psychology and their local environment. (Bearing in mind, here, that some global directional eliminativists might think that the former is itself explained by features of the latter, while others might think these are at least partly independent factors.)

Consider the sentence ‘D is the direction towards the future’. Let’s suppose, as is plausible, that ‘D’ is a demonstrative, (i.e., a kind of indexical) which depending on the context of utterance, picks out a particular direction along the temporal axis. So as we will understand the sentence, it is equivalent to something like ‘THAT is the direction towards the future’. Then ‘D’ picks out a particular gradient along the temporal axis, and which gradient that is, depends on which gradient is demonstrated at a context of utterance. In what follows we will assume, for simplicity, that all speakers, at their contexts, use ‘D’ to pick out the positive gradient.

Then according to indexical contextualism, sentences like this are doubly indexical: they have an explicit indexical—the use of ‘D’—and they have an implicit indexical that appeals to the psychological properties of the speaker. Hence when this sentence is uttered at a centred world, it expresses something like the following proposition: <at w, at t, relative to i (that is, according to i’s deliberative psychology and location in w at t), the positive gradient is the direction towards the future>. To be more precise, the indexical contextualist could offer the following truth-conditions for certain everyday directional sentences uttered at contexts (i.e. assertions).

Indexical Contextualist Truth-Conditions for Temporal Direction

‘D is the direction towards the future’, uttered at <w, t, i> is true iff at <w, t, i>:

(i) D is identical with gradient G along the temporal axis and

(ii) For i, G runs from FIXTURES, to OPTIONS.

‘D is the direction towards the past’, uttered at <w, t, i> is true iff at <w, t, i>:

(i) D is identical with gradient G along the temporal axis and

(ii) For i, G runs from OPTIONS, to FIXTURES.

These conditions are fairly straightforward. We know what it is for the temporal axis to have a positive and negative gradient. G simply picks out one of these gradients. Then (i) obtains just in case D is identical with G. Since we know what it is for a gradient to run from OPTIONS to FIXTURES or from FIXURES to OPTIONS we know what it is for (ii) to obtain.

Moving on, we can provide truth-conditions for assertions involving apparently directed temporal relations as follows:

Indexical Contextualist Truth-Conditions for Temporal Relations

‘E is earlier than E\*’, uttered at <w, t, i> is true iff:

(i) E and E\* are C-related and

(ii) At <w, t> for i, G runs from FIXTURES, to OPTIONS and

(iii) G runs from E to E\*.

‘E is later than E\*’, uttered at <w, t, i> is true iff:

(i) E and E\* are C-related and

(ii) At <w, t> for i, G runs from FIXTURES, to OPTIONS and

(iii) G runs from E\* to E.

Consider the case of ‘E is earlier than E\*’. Again, (i), and (ii) have already been explicated. Informally glossed, (iii) simply says that E\* is ‘further along’ whichever gradient G is, than is E.

To get a feel for these truth-conditions, consider a ‘mirror world’ (w1), in which each temporal half is a mirror image of the other.[[15]](#footnote-15) Let’s divide that world into temporal half 1, and temporal half 2. Let’s suppose that Freddie is in temporal half 1, and Annie is in temporal half 2, and let’s stipulate that Freddie[[16]](#footnote-16) and Annie are doppelgängers: each is the mirror image of the other. Since they are psychologically indistinguishable, any differences between the way they divide the world into OPTIONS and FIXTURES is a merely locative difference. And, indeed, we can expect that they will divide the world differently, given their respective locations.

An utterance, by Freddie, at <w1, tn> of ‘D is the direction towards the future’ is, let us suppose, true. Recall that we are supposing that all speakers are using the demonstrative, ‘D’, to pick out the positive gradient. Then Freddie’s utterance is true because D is identical with the positive gradient, and Freddie’s deliberative psychology is such that the positive gradient runs *from* FIXTURES to OPTIONS. Now consider the same utterance, made by Annie, at <w1, tn\*> (t n\* is the mirror time of tn). That utterance is false. D is identical with G (the positive gradient). But it is not true, given Annie’s deliberative psychology, that the positive gradient runs from FIXTURES to OPTIONS. Rather, given Annie’s deliberative psychology (which is just like Freddie’s, remember) the positive gradient runs from OPTIONS to FIXTURES, and it is the negative gradient that runs from FIXTURES to OPTIONS. So although Freddie’s utterance is true, Annie’s utterance is false, which is as it should be.

Now consider Jessie. Jessie is located near Annie, but her deliberative psychology is very different from Freddie’s and Annie’s. As a result, the way Jessie partitions the world into OPTIONS and FIXTURES is such that, when she utters the same sentence ‘D is the direction towards the future’ what she says is true. For, unlike Annie, relative to Jessie’s deliberative psychology, G does run from FIXTURES to OPTIONS. Once again, the picture we have in mind is best represented via a diagram.

To sum up, Freddie is different from Annie and Jessie with respect to the local environment. Jessie is different from Freddie and Annie with respect to deliberative psychology. Thus, the disagreement between Freddie and Annie is merely locative, while the disagreement between Annie and Jessie is merely psychological.

Given indexical contextualism the *proposition* expressed by Freddie is true at any context, as is the proposition expressed by Jessie; the proposition expressed by Annie is false at any context. That’s because Freddie’s utterance of ‘D is the direction towards the future’ expresses something like: <at w1, tn, i, the positive gradient is the direction towards the future>. Since i is Freddie, and since relative to Freddie’s deliberative psychology the positive gradient is the direction towards the future, that proposition is true, and true at any context. For analogous reasons, the proposition Annie expresses when she utters the same sentence is false at any context. Thus, were Freddie or Jessie to express the proposition Annie in fact expresses, what each says would be false. Still, what Annie, Freddie, and Jessie *in fact* *express* by their utterances of the relevant directional sentence depends on their context (on where they are, and what their psychologies are like), and that is why Freddie’s and Jessie’s utterances are true, and Annie’s false.

There are, however, two reasons to be sceptical that indexical contextualism correctly captures the content of Annie, Jessie, and Freddie’s utterances. First, one might worry that it means that Annie and Freddie can never *truly* disagree about which direction is future, since when one utters directional sentence P, and the other utters not P, it won’t be the case that the latter utters the negation of what the former utters. This is, of course, a perfectly general worry about indexical contextualism, and not specific to considering directional assertions. Any general reasons one has to prefer a non-indexical version of contextualism (see §4.2), or, indeed, some version of relativism (see §5) will generalise to the case of directional utterances.

However, one concern is that there appears to be a clear sense in which although Freddie and Jessie seem to agree, in fact they do not really agree. Or perhaps better: they agree but only because they mean something slightly different by their directional assertions. Yet according to indexical contextualism *all three* mean something slightly different by their directional assertions, insofar as all three express different propositions by their utterances. So we cannot capture the different senses in which Annie and Freddie both agree and disagree, from the different senses in which Freddie and Jessie both agree and disagree.

The indexical contextualist has some resources with which to respond to this concern. She can concede that wherever they are located, Jessie, Annie and Freddie will express a different proposition by an utterance of ‘D is the direction towards the future’. However, she can point out that were Jessie and Annie to make the same utterance while located where Freddie is in fact located, Annie would utter something true, and Jessie something false. This is because while the disagreement between Freddie and Annie is merely locative, the disagreement between Annie and Jessie is merely psychological. So Annie and Freddie agree in the sense that, were Annie located where Freddie is, her utterance (which is, in fact, false) would be true. Conversely, though Jessie’s utterance is, in fact, true, were she to utter it where Freddie is, it would be false. That is the sense in which Freddie and Jessie mean something different by ‘D is the direction towards the future’ than do Freddie and Annie: namely that were all three co-located, what Freddie and Annie would say would be true, and what Jessie would say would be false. This solution is far from elegant, however, and thus this problem motivates consideration of whether other proposals can do better.

A second worry is an analogue of a concern Ismael ([2016](#_ENREF_15)) raises regarding Price’s (2007) causal perspectivalism. Roughly speaking, the objection is that it is implausible that features of the context of utterance make an appearance in the *content* of what is said when the relevant context does not differ between communicating speakers. Sometimes features of context do differ: expressions such as ‘I’, ‘near’, ‘far’, ‘foreign’, ‘indigenous’ and so on, are expressions whereby the context varies between speakers. Ismael argues that in the case of causation this is not so, since in fact everyone who discusses what causes what is in the same causal context. The same is, arguably, true in the case of temporal direction: the psychologies and local environment of those engaged in everyday directional talk are sufficiently similar that they all share the same context. Hence there is no reason for the content of these expressions to include a hidden indexical parameter.

We think it unclear whether linguistic communities need to recognise the role of different contexts in determining content—or at least, recognise that there are different contexts—in order for it to be the case that those contexts do in fact determine content. Nevertheless, for those who find an objection such as this compelling, in what follows we offer a non-indexical contextualist semantics according to which features of context do not determine content, but determine the truth-conditions of utterances in context. Henceforth, for simplicity, we focus principally on explicating competing versions of non-indexical contextualism, though these variants could instead be spelled out as variants of indexical contextualism for those who find that view preferable.

## **4.2 Non-indexical Contextualist Semantics**

According to non-indexical contextualist accounts of everyday directional assertions, the role of context is both to determine the content of what is uttered, and also to determine the conditions under which the proposition expressed by such utterances is true or false. The role of context determines the content of what is uttered, at least in some cases, because even the nonindexical contextualist is going to hold that ‘D’ is a demonstrative, and that which direction it picks out is determined by the context of utterance. Again, in what follows we hold fixed that in fact, at each context ‘D’ picks out the positive gradient. However, the nonindexical contextualist will say that context also determines whether the proposition that is expressed, once we fill in the details of the demonstrative, is true at a context. In other words, holding fixed that ‘D’ picks out the positive gradient, two utterances of ‘D is the direction towards the future’ at different contexts will both express the same proposition. However it might still be that the proposition expressed at those two contexts, is true at one, and false at the other.

Suppose again that contexts of utterance are centred worlds. Then an utterance of the form ‘D is the direction towards the future’ expresses a proposition that determines a truth-value relative to a <w, t, i> triple. To get a feel for how this might work, let’s consider the following truth-conditions:

Non-indexical Contextualist Truth-Conditions for Temporal Direction

(Individualistic Version)

‘D is the direction towards the future’ uttered at <w, t, i> is true iff at <w, t, i>:

(i) D is identical with gradient G and

(ii) For i, G runs from FIXTURES to OPTIONS.

Notice that these are the same truth-conditions we offered on the part of the indexical contextualist (so we won’t repeat the truth-conditions for ‘D is the direction towards the past’, or for temporal relations). Indeed, the crucial difference between these views is that non-indexical contextualism does not entail that the way things are for i, (in terms of i’s deliberative psychology) at a context (i.e. at a location in a world), is part of the meaning of i’s utterances at that context.

As before, then, let us consider Freddie, Annie, and Jessie. Freddie and Jessie’s utterances of ‘D is the direction towards the future’ will be true, and Annie’s will be false, just as before. However, according to non-indexical contextualism, Annie, Freddie and Jessie express the same proposition when each utters that sentence. Given this, the non-indexical contextualist arguably has an advantage over the indexical contextualist since she can easily explain the respect in which Annie disagrees with Freddie, and Jessie does not: Annie (truly) utters the negation of the proposition Jessie and Freddie (truly) express by ‘D is the direction towards the future’ when she says ‘it is not the case that D is the direction towards the future’. As noted previously, this is a perfectly general feature of non-indexical versus indexical contextualism. Whether it constitutes a reason to prefer one to the other remains controversial, and is not something about which we will have more to say.

It is worth noting, however, that the non-indexical contextualist still needs to say something about the respect in which, in virtue of their shared deliberative psychology, Annie and Freddie seem to mean the same thing by their utterance, while Freddie and Jessie do not. After all, according to her, all three assert the same proposition by an utterance of ‘D is the direction towards the future’. Here, we think, the non-indexical contextualist can borrow from the indexical contextualist. She can note that were Jessie and Annie both located where Freddie is located, what Jessie utters would be false, and what Annie utters would be true, even though all three would be uttering the same proposition. This is the sense in which there is something in common between Freddie’s true utterance and Annie’s false utterance, which is not in common between Freddie and Jessie’s true utterances.

Another potential objection is that these truth-conditions are objectionably individualistic, insofar as they appeal only to the deliberative psychology of the speaker. But, one might worry, whether a directional utterance comes out as true (or false) at a context, ought be sensitive to something like the *community* standards of deliberation, rather than the particular psychology of the speaker. For those who share this concern, something like the following might be appealing:

Non-indexical Contextualist Truth-Conditions for Temporal Direction

(Communitarian Version)

‘D is the direction towards the future’ uttered at <w, t, i> is true iff at <w, t, i>:

(i) D is identical with gradient G and

(ii) Most of the community in which i is embedded at t are such that for them, G runs from FIXTURES to OPTIONS.

The idea is that what matters in assessing the truth of an utterance of ‘D is the direction towards the future’ at a centred world are the deliberative psychologies of most of those within the community in which the speaker at that centre is embedded.

What is at stake between the individualist and the communitarian is whether certain kinds of disagreement are *faultless* or not. We are inclined to prefer the individualistic over the communitarian version of non-indexical contextualism. That’s because we think the directional eliminativist ought conclude that there *can* be faultless disagreement between two members of the same community regarding which direction is future, if they partition the world differently into OPTIONS and FIXTURES in virtue of having entirely different psychologies.

For instance, suppose that after much travelling an alien arrives in a community, and joins that community. Suppose that in said community, for everyone but the alien, G runs from FIXTURES to OPTIONS, but given the alien’s psychology, G runs from OPTIONS to FIXTURES. We are tempted to think this is a case of faultless disagreement between the alien and the other members of the community. But suppose the communitarian thinks that once the alien has been suitably enmeshed in the community, then she is a member of that community. Then the communitarian will conclude that all of the alien’s everyday directional utterances are false. So the disagreement is not faultless at all.

The communitarian might resist this outcome by maintaining that the alien is not part of her local community. She might insist that a necessary condition for being a member of a community is that everyone in that community partitions the world into OPTIONS and FIXTURES in the same manner. That is not entirely unmotivated. Insofar as community life requires some kind of joint planning and group deliberation, it will be necessary for members of the community to, at least for all practical purposes, partition the world in the same manner. If so, the alien is clearly not a member of the community.

If, however, the communitarian restricts community membership in this manner, her semantics will deliver the same results as the individualistic semantics. Since individualism is the simpler of the views, we should in that case prefer it to communitarianism. If communitarianism does not deliver the same results, however, then it remains unclear whether it can accommodate faultless disagreement. If it cannot, or if it can do so only at the cost of significant complexity, then this is reason to prefer individualism (unless one disagrees with us that there are any such faultless disagreements).

At this point one might wonder, however, if individualism allows for *too many* faultless disagreements. For consider Mary, who grew up in the community in question, but whose deliberative psychology has been radically affected by being dropped at birth, and then fed on a cocktail of hallucinogenic drugs. One might think that even if the alien’s disagreement with other members of the community is faultless, Mary’s is not. Mary is just wrong in many of her directional utterances. We will not take a stand on this issue here, except to say that individualistic contextualism could accommodate this sort of case by, for instance, appealing to the proper functioning (in the evolutionary sense) of the deliberative psychological mechanism. Since the alien’s deliberative psychology is (let us suppose) properly functioning, then his deliberative utterances will come out as true; since Mary’s is not, then her utterances will come out as false and her disagreement with the other members of the community will not be faultless.

Finally, what ought Annie, Freddie and Jessie make of their respective utterances of ‘D is the direction towards the future’? Well, all three can agree that their utterances express the same proposition, and that that proposition is true at Freddie’s and Jessie’s context, but false at Annie’s context. In addition, we might follow McFarlane (2009) and distinguish utterance truth from proposition truth. When Annie truly says that what Freddie says is false—since the proposition Freddie expresses is false at her context—she is using the notion of proposition truth. However, as MacFarlane formulates the view, Annie should nonetheless say that Freddie *speaks truly in uttering* that ‘D is the direction towards the future’ (Freddie’s utterance is true) because the proposition is true at Freddie’s context.

MacFarlane (2009:248) accepts that it ‘certainly sounds weird on first hearing’ that Annie should say that what Freddie says is false, and yet that Freddie speaks truly in so uttering, but insists that utterance truth is a technical notion, and suggests that ‘we had better make sure our intuitions about it are in line with our theories, not the other way around’. The notion of utterance truth captures the sense in which all three should judge, regardless of features of their own context, that Freddie and Jessie both speak truly in uttering ‘D is the direction towards the future’, but Annie does not.

We can thus see how Annie can disagree with Freddie about the truth of the proposition they both express with their respective utterances—at Annie’s context it is false, while at Freddie’s it is true—and yet accept that Freddie speaks truly in so uttering. Still, it is undeniably odd to embrace a view on which Annie can consistently and truly assert that ‘Freddie’s utterance is true even though the proposition she expresses is false’. This oddity motivates consideration of a relativist semantics.

# **5 Relativist Semantics**

A relativist semantics allows that context ‘gets into the picture’ twice over, by allowing us to include not only features of the speaker’s *context of* *utterance*, but also features of an assessor’s *context of* *assessment*. To see how this works, consider the following relativist semantics in its individualistic version. (We leave it to the interested reader to develop a communitarian version.)

Relativist Truth-Conditions for Temporal Direction

‘D is the direction towards the future’ uttered at <w, t, i> is true relative to a context of assessment, <w, t\*, i\*> iff at <w, t\*, i\*>:

(i) D is identical with gradient G and

(ii) *For i\**, G runs from FIXTURES to OPTIONS.

There are two things to notice about this proposal. First, it allows the time and individual at the context of assessment to vary from the time and individual at the context of utterance, but it does not allow the world to vary. This means that if an individual—let’s call her Jane—is in w\*, and is assessing Freddie’s utterances in w, these semantics are silent on whether Jane ought to conclude that what Freddie says is true, or false. We are not entirely unhappy with that outcome. Since Jane is not embedded in w, and doesn’t deliberate about things along the G gradient in w, it’s not clear what it would mean for it to be the case that at her context of assessment, G runs from FIXTURES to OPTIONS.

One could, of course, amend the semantics and replace the relevant clause with a counterfactual such as: were i\* to be located where i is, then it would be the case that at <w, t\*> for i\*, G runs from FIXTURES to OPTIONS. That will be true just in case the deliberative psychologies of i and i\* are similar, such that were i\* to be in w, at i’s context, then for i\* G would run from FIXTURES to OPTIONS. Those who think that a semantics such as ours ought to generalise to assessors in other possible worlds might adopt this strategy. We, however, are content with restricting the semantics to members of a single world.

Second, this semantics delivers the same results as the previous semantic proposals if we take the assessor to be the speaker, that is, if <w, t, i> = <w, t\*, i\*>. For then the context of assessment just is the context of utterance. It only delivers different results in cases in which someone assesses an utterance they themselves did not utter, as for instance when Freddie is assessing Annie’s utterance of ‘D is the direction towards the future’.

When the deliberative psychology of i\* is different from that of i (or when t is different from t\* in such a way that i and i\*, despite having the same deliberative psychology, differently partition the world into OPTIONS and FIXTURES) the semantics may deliver a different truth-value from the previous proposals. This will be so whenever i and i\* disagree about whether G runs from FIXTURES to OPTIONS, or OPTIONS to FIXTURES.

Consider again Annie, Freddie and Jessie in the mirror world (see figure 2). Freddie thinks that G runs from FIXTURES to OPTIONS. So when Annie utters ‘D is the direction towards the future’, Freddie ought not only judge that the proposition Annie expresses is true, but also that her utterance is true, when assessed at her, Freddie’s, context. By contrast, Annie thinks that G runs from OPTIONS to FIXTURES. So when Freddie utters ‘D is the direction towards the future’, Annie will judge not only that the proposition Freddie expresses is false, but also that her utterance is false, when assessed at her, Annie’s, context. By incorporating a context of assessment into the semantics, the relativist can avoid the awkward upshot of nonindexical contextualism whereby Annie can consistently and truly assert that ‘Freddie’s utterance is true even though the proposition she expresses is false’.

It will still, of course, be the case that what Jessie says and assesses to be true at her context, will also be assessed as true at Freddie’s context. But, as before, we can note that had Jessie made—and assessed—the same utterance at Freddie’s context, what Jessie says would be false. So the relativist can make sense of the idea that there is something not in common between Jessie and Freddie, by noting that if we move Jessie to Freddie’s context, assessed at that context Jessie will be uttering falsehoods.

If one thinks that Freddie *ought* be able to truly say that Annie’s utterance is true, not merely that ‘Annie’s utterance is false (she speaks falsely), but the proposition she expresses is true’ then one ought be motivated towards a relativist semantics. If not, then the nonindexical contextualist semantics we offered ought be appealing. Intuitions diverge here, and our primary goal is not to push for relativism over its competitors, but rather, to show that there is some plausible set of truth-conditions that can be offered on the part of the global directional eliminativist.

**6 Conclusion**

We have developed three different proposals on behalf of the global directional eliminativist. Each vindicates the truth of everyday directional assertions without presupposing that the world has a single global direction of the kind posited by the global directional realist. In so doing, we hope to shown that global directional eliminativism is a more attractive view than many have thought.

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1. See Broad ([1923](#_ENREF_5)), Cameron ([2015](#_ENREF_7)), and Tooley ([1997](#_ENREF_35)). [↑](#footnote-ref-1)
2. There is also a reading of Callender ([2017](#_ENREF_6)) on which he is a directional eliminativist in this sense. See [Baron and Evans (2018)](#_ENREF_3) [↑](#footnote-ref-2)
3. Of course while C-theorists think that the C-relations have these formal features, and necessarily so, they don’t think that having these formal features is sufficient for something to be a C-relation: clearly many other non-temporal ordering relations have the self-same formal features. So the claim is not that the existence of relations with these formal features is sufficient for there to be time, but rather, that there being C-relations is sufficient for there to be time. [↑](#footnote-ref-3)
4. Some use ‘B-theory’ as roughly synonymous with ‘block universe theory’. So long as the latter is silent on whether or not time has a direction, this usage is a different from our usage here, according to which all B-theorists are global directional realists and C-theorists are a species of block universe theorist. [↑](#footnote-ref-4)
5. Or, perhaps the reduction is global, but yields different directions at different locations. [↑](#footnote-ref-5)
6. For example, see Mellor ([2009, p. 456](#_ENREF_25)) and Reichenbach ([1956](#_ENREF_30)). It is unclear whether to read Boltzmann ([1964](#_ENREF_4)) as a directional eliminativist or a local reductionist. [↑](#footnote-ref-6)
7. One common line of argument against robust temporal passage alleges that it is inconsistent. For the original formulation of this argument see McTaggart ([1908](#_ENREF_23)); for a contemporary defence see Smith ([2011](#_ENREF_31)). Another line of argument focuses on the lack of fit with the special theory of relativity. For an early presentation of this argument see Putnam ([1967](#_ENREF_29)); for a contemporary overview see Baron ([2018](#_ENREF_2)). [↑](#footnote-ref-7)
8. For an overview of endurance and perdurance see Effingham ([2012](#_ENREF_9)). [↑](#footnote-ref-8)
9. See Greene & Sullivan ([2015](#_ENREF_14)). [↑](#footnote-ref-9)
10. See Caruso ([2010](#_ENREF_8)) and Greene, Latham, Miller & Norton ([2020](#_ENREF_13)). [↑](#footnote-ref-10)
11. Gallois ([1994](#_ENREF_12)) refers to it as the attitude asymmetry thesis, though this thesis includes the additional claim that we have reason to have these attitudes. [↑](#footnote-ref-11)
12. See Price ([2007, pp. 274-276](#_ENREF_28)) [↑](#footnote-ref-12)
13. Exactly what counts as the same local environment will likely be a vague matter. For our purposes all that matters is that the distinction between psychological and locative disagreements is clear. [↑](#footnote-ref-13)
14. For instance, Mellor (2009) denies that there can be merely psychological differences, for just this reason. [↑](#footnote-ref-14)
15. Mirror worlds of this kind have also been called ‘Gold Universes’ (Price ([1996](#_ENREF_27))). [↑](#footnote-ref-15)
16. Short for Frederika. [↑](#footnote-ref-16)