

DOI: <https://doi.org/10.22201/iifs.18704905e.2025.1753>

## INDEXICALS: A PROBLEM FOR CHALMERS’ TWO-DIMENSIONAL SEMANTICS

STEFAN RINNER

University of Duisburg-Essen  
Germany

[stefan.rinner@uni-due.de](mailto:stefan.rinner@uni-due.de)

<https://orcid.org/0000-0002-0008-3884>

**SUMMARY:** As Chalmers himself notes, his two-dimensional semantics leads to the problem of how scenarios, i.e. epistemically possible worlds, can best represent the information who I am, where I am, and what time it is now. For Chalmers, the natural solution to this problem of indexicality is to identify scenarios with *centered* worlds: ordered tuples of (possible) worlds, individuals, times, and places. According to such a solution, two arbitrary tokens of ‘now’ and ‘here’ (respectively) have the same primary (or epistemic) intension, picking out the time/place marked at the center of any given scenario. Against this, I will object that there are a posteriori true, i.e. epistemically contingent, utterances of both ‘Now = now’ and ‘Here = here’. Since identifying scenarios with centered worlds seems to be the natural solution to the problem of indexicality, this will undermine Chalmers’ two-dimensional semantics.

**KEYWORDS:** centered worlds, epistemic possibility, identity statements, necessary a posteriori truths, primary intensions

**RESUMEN:** Como el propio Chalmers señala, su semántica bidimensional conduce al problema de cómo los escenarios —es decir, los mundos epistémicamente posibles— pueden representar de la mejor manera la información acerca de quién soy, dónde estoy y qué hora es ahora. Para Chalmers, la solución natural a este problema de la indexicalidad consiste en identificar los escenarios con mundos *centrados*: tuplas ordenadas de mundos (posibles), individuos, tiempos y lugares. Según esta solución, dos casos arbitrarios de “ahora” y “aquí” (respectivamente) tienen la misma intensión primaria (o epistémica), al designar el tiempo o el lugar marcados en el centro de cualquier escenario dado. Frente a esto, objetaré que hay enunciados de “Ahora = ahora” y “Aquí = aquí” que son verdaderos *a posteriori*, es decir, epistémicamente contingentes. Dado que identificar los escenarios con mundos centrados parece ser la solución natural al problema de la indexicalidad, esto socavará la semántica bidimensional de Chalmers.

**PALABRAS CLAVE:** mundos centrados, posibilidad epistémica, enunciados de identidad, verdades necesarias *a posteriori*, intensiones primarias

## 1. Introduction

In the last twenty years, Chalmers has been arguing for the following two-dimensional semantics (2002, 2004, 2006, 2011a and 2011b):<sup>1</sup>

- ( $T_1$ ) Every expression (or thought) token (of the sort that is a candidate to have an extension) is associated with a primary (or epistemic) intension and a secondary intension. A primary intension is a function from scenarios (epistemically possible worlds) to extensions. A secondary intension is a function from (metaphysically) possible worlds to extensions.
- ( $T_2$ ) When the extension of a complex expression (or thought) token depends compositionally on the extensions of its parts, its primary and secondary intensions depend compositionally on the primary and secondary intensions (respectively) of its parts, by applying the compositionality of extensions across scenarios and worlds.
- ( $T_3$ ) The extension of an expression (or thought) token coincides with the value of its primary intension at the scenario of utterance and with the value of its secondary intension at the world of utterance.
- ( $T_4$ ) A sentence (or thought) token  $S$  is (metaphysically) necessary iff the secondary intension of  $S$  is true at all worlds.<sup>2</sup>
- ( $T_5$ ) A sentence (or thought) token  $S$  is a priori true, i.e. epistemically necessary, iff the primary intension of  $S$  is true at all scenarios.<sup>3</sup>

<sup>1</sup> A similar theory has been advocated by Jackson (1998a and 1998b).

When presenting his theory, Chalmers sometimes uses the apparatus of expressions in contexts. However, he prefers to work with expression tokens, among other things, because of the difficulties to make sense of the primary intension of an expression relative to a context in which the expression is not uttered (see Chalmers 2011a, fn 1).

<sup>2</sup> And a sentence (or thought) token  $S$  is (metaphysically) contingent iff  $S$  is true and the secondary intension of  $S$  is false at some world.

<sup>3</sup> And a sentence (or thought) token  $S$  is a posteriori true, i.e. epistemically contingent, iff  $S$  is true and the primary intension of  $S$  is false at some scenario.

Since we will evaluate the epistemic status of sentences only with respect to the actual world, I omit Chalmers and Rabern's (2014) liveness constraint, according to which a sentence is a priori in a world  $w$  only if its secondary intension in  $w$  does not differ from the one it actually has. The constraint has been introduced to escape *the Nesting Problem*, i.e. the possibility that a contingent sentence can be a priori true with respect to counterfactual worlds in which it is false.

For now, I assume that scenarios are possible worlds and that the scenario of utterance simply is the world of utterance (see Chalmers 2002, p. 145). Accordingly, a (metaphysically) possible world  $w$  is epistemically possible if and only if it cannot be ruled out by (ideal) reasoning alone that  $w$  is actual.

In this paper, I will present an argument against Chalmers' two-dimensional semantics, starting from his analysis of indexicals. I will begin by arguing with Chalmers that in connection with indexicals, his two-dimensional semantics leads to the problem of how scenarios can best represent the information who I (the speaker) am, where I am, and what time it is now. This is the problem of indexicality. For Chalmers (2002, 2004, 2006, 2011a and 2011b), the natural solution to the problem of indexicality is to identify scenarios with *centered* worlds: ordered tuples of worlds, individuals, times, and places, with the individual, the time, and the place being the *center* of the world. According to such a solution, two arbitrary tokens of 'now' and 'here' (respectively) have the same primary intension, picking out the time/place marked at the center of any given scenario. Against this, I will object that there are a posteriori true utterances of both 'Now = now' and 'Here = here'. I will call this *the problem of a posteriori truths*. We will see that as long as Chalmers' two-dimensional semantics entails compositionality, i.e. ( $T_2$ ), the centered-worlds account does not provide a solution to the problem of a posteriori truths. Since identifying scenarios with centered worlds seems to be the natural solution to the problem of indexicality, this will undermine Chalmers' two-dimensional semantics.

The paper is structured as follows. In Section 2, I will present the problem of indexicality and Chalmers' solution to the problem, which is to identify scenarios with centered worlds. In Section 3, I will briefly discuss a posteriori true identity statements with proper names, such as 'Hesperus = Phosphorus', and I will argue that the following principle is a corollary of Chalmers' two-dimensional semantics:

(AP) If an idealised speaker cannot rule out by reasoning alone that a sentence (or thought) token  $S$  is false, then  $S$  is a posteriori true if true.

Starting from this, in Section 4, we will see that in addition to a posteriori true utterances of identity statements with proper names, there are also a posteriori true utterances of 'Now = now' and 'Here = here'. Since the centered-worlds account cannot explain this, an

advocate of Chalmers' two-dimensional semantics has to come up with an alternative candidate for scenarios which provides both a solution to the problem of indexicality and a solution to the problem of a posteriori truths. As said above, this will be no easy task.

## 2. *The Problem of Indexicality*

Roughly, the primary intension of an expression (or thought) token is characterised as follows (see, e.g., Chalmers 2002, pp. 145–148):<sup>4</sup>

(PI) The primary intension of an expression (or thought) token *e* assigns to a scenario *s* the extension an idealised speaker with the right sort of information about *s* would assign to *e* under the hypothesis that *s* is actual.

For example, if *s* is a scenario where Neptune is the brightest star in the evening, then under the hypothesis that *s* is actual, an idealised speaker with the right sort of information about *s* would assign Neptune to a token of 'Hesperus', and not Venus. This is why, according to Chalmers (2002, 2011a), primary intensions incorporate many of the properties that traditionally have been associated with Fregean senses, such as the determination of reference, cognitive significance, and compositionality (Frege 1892, 1918–1919). However, Chalmers (2011b, pp. 68–69) also notes that if scenarios are nothing other than possible worlds, then in connection with indexicals, (PI) leads to the following problem.

A full description of a possible world might leave open who I (the speaker) am, where I am, and what time it is now. Therefore, even an idealised speaker with a full description of a possible world *w* might lack the right information to determine the extension of a token of 'I', 'here', or 'now' under the hypothesis that *w* is actual. For this, the speaker needs some locating information: a marker indicating which individual they are, where they are, and what time it is. The question of how to best represent this information is what I call *the problem of indexicality*.

The solution to the problem of indexicality cannot simply be that at an arbitrary scenario *s* the primary intension of a token *r* of 'now' picks out the time of utterance of *r* in *s*. According to such a solution, *r* or at least some token of 'now' would have to exist in every scenario. However, since it can neither be known a priori that *r* exists nor that

<sup>4</sup> Note that this does not require that a token of *e* exists in *s* (see Chalmers 2002, pp. 147–148, 166).

some token of ‘now’ exists, there are scenarios in which no token of ‘now’ exists (see, e.g., Chalmers 2002, pp. 147–148).

This is why, according to Chalmers (2002, p. 155; 2011a, p. 598; 2011b, p. 69), the natural solution to the problem of indexicality is to identify scenarios with *centered* worlds: ordered tuples of worlds, individuals, times, and places, with the individual, the time, and the place being the *center* of the world. Such a solution has the advantage that two arbitrary tokens of ‘now’, ‘here’, and ‘I’ (respectively) have the same primary intension: the primary intension of ‘now’ picking out the time marked at the center of any given scenario, the primary intension of ‘here’ picking out the place marked at the center of any given scenario, and the primary intension of ‘I’ picking out the individual marked at the center of any given scenario. However, this is at the cost that the primary intension of an indexical sentence such as ‘It is now Saturday’ no longer has an absolute truth-value, but instead is true or false only with respect to a time, a place, or a subject.

Another corollary of the centered-worlds account is that every utterance of ‘Now = now’ or ‘Here = here’ is a priori true. After all, according to the centered-worlds account, two arbitrary tokens of ‘now’ and ‘here’ (respectively) have the same primary intension, picking out the time/place marked at the center of any given scenario. Against this, I will object that there are a posteriori true (and even false) utterances of both ‘Now = now’ and ‘Here = here’. But first, I will briefly discuss a posteriori true identity statements in connection with proper names.

### 3. *A Posteriori True Identity Statements*

One of the main reasons for Chalmers to advocate a two-dimensional semantics is to explain how there can be sentence (and thought) tokens that are metaphysically necessary without being epistemically necessary. Following Kripke (1980), a well-known example are identity statements with proper names, such as ‘Hesperus = Phosphorus’. Since proper names are metaphysically rigid, i.e. their extension does not vary across (metaphysically) possible worlds, an utterance of ‘Hesperus = Phosphorus’ is metaphysically necessary. However, *prima facie*, such an utterance is not a priori. After all, even an idealised speaker cannot know by reasoning alone that an utterance of ‘Hesperus = Phosphorus’ is true.

For most philosophers, the explanation cannot be that ordinary names, such as ‘Hesperus’ and ‘Phosphorus’, are both metaphysi-

cally and epistemically rigid and that identity statements such as ‘Hesperus = Phosphorus’ simply show that there are epistemically possible worlds that are not metaphysically possible.<sup>5</sup> Even if there are epistemically possible worlds that are not metaphysically possible, it does not seem to be an epistemic possibility that Hesperus is not identical with itself. Therefore, for Chalmers, the explanation of such examples has to be that although ordinary names, such as ‘Hesperus’ and ‘Phosphorus’, are metaphysically rigid, they are not epistemically rigid.<sup>6</sup>

This is where the two-dimensional semantics enters the scene. Although the secondary intension of a ‘Hesperus’ token picks out Venus in every metaphysically possible world in which Venus exists, its primary intension does not pick out Venus in every scenario in which Venus exists (Chalmers 2002, pp. 145–146). As said above, the primary intension of an expression token *e* assigns to a scenario *s* the extension an idealised speaker with the right sort of information about *s* would assign to *e* under the hypothesis that *s* is actual. For example, if *s* is a scenario where Neptune is the brightest star in the evening, then under the hypothesis that *s* is actual, an idealised speaker with the right sort of information about *s* would assign Neptune to a token of ‘Hesperus’, and not Venus. Similarly, if *s* is a scenario where Jupiter is the brightest star in the morning, then under the hypothesis that *s* is actual, an idealised speaker with the right sort of information about *s* would assign Jupiter to a token of ‘Phosphorus’, and not Venus.<sup>7</sup> Since it cannot be ruled out by ideal reasoning alone that a scenario where the brightest star in the evening is not the brightest star in the morning is actual, it follows that although an utterance of ‘Hesperus = Phosphorus’ has a necessary secondary intension, its primary intension is contingent.

The reason why most philosophers believe that an utterance of ‘Hesperus = Phosphorus’ is a posteriori true is that even an idealised

<sup>5</sup> *Epistemically rigid* means that their extension does not vary across scenarios (epistemically possible worlds).

<sup>6</sup> According to Soames (2011), ordinary names, such as ‘Hesperus’ and ‘Phosphorus’, are both metaphysically and epistemically rigid. Soames then argues that contrary to our intuitions, identity statements such as ‘Hesperus = Phosphorus’ are a priori true if true. Salmon (2024), on the other hand, maintains that there are indeed epistemically possible worlds in which Hesperus is not identical with itself. Thus, from the claim that proper names are epistemically rigid, it does not follow that ‘Hesperus = Phosphorus’ is epistemically necessary.

<sup>7</sup> For the sake of the argument, I here assume that the referents of ‘Hesperus’ and ‘Phosphorus’ are fixed by the descriptions ‘the brightest star in the evening’ and ‘the brightest star in the morning’ (respectively).

speaker cannot rule out by reasoning alone that such an utterance is false, i.e. most philosophers would accept the following principle:<sup>8</sup>

(*AP*) If an idealised speaker cannot rule out by reasoning alone that a sentence (or thought) token *S* is false, then *S* is a posteriori true if true.

(*AP*) is a corollary of Chalmers' two-dimensional semantics. If an idealised speaker cannot rule out by reasoning alone that a sentence (or thought) token *S* is false, then there is a scenario *s* such that the speaker would assign the falsity to *S* under the hypothesis that *s* is actual. Since according to (*PI*), this is tantamount to saying that the primary intension of *S* is false at *s*, it would follow together with (*T*<sub>5</sub>) that *S* is a posteriori true if true.

In the next section, I will argue that there are true utterances of 'Now = now' and 'Here = here' such that even an idealised speaker cannot rule out by reasoning alone that they are false. Together with (*AP*), it will follow that there are a posteriori true utterances of both 'Now = now' and 'Here = here'.

#### 4. *The Problem of A Posteriori Truths*

Let us assume that Mary, an idealised speaker, is sitting in a fake time machine, but that she erroneously believes that the time machine she is sitting in is real. Then, we can think of an utterance of 'Now = now' where Mary produces a token of 'now' at a time *t*, pushes the start button of the fake time machine, and since nothing happens and she thus realises that the machine is fake, produces a token of 'is now' at *t*. In this case, Mary certainly cannot rule out by reasoning alone that her utterance of 'Now = now' is false. Together with (*AP*), it follows that her utterance is a posteriori true. Prima facie, the centered-worlds account cannot explain this. After all, according to the centered-worlds account, two arbitrary tokens of 'now' have the same primary intension, picking out the time marked at the center of any given scenario. This is the problem of a posteriori truths.

The problem also arises in connection with 'here'. For example, Mary could be sitting in a fake teleportation machine, but erroneously believe that she is sitting in a real one. In such a case, we can think of an utterance of 'Here = here' where Mary produces a token of 'here' at a place *p*, pushes the start button of the fake teleportation machine, and since nothing happens and she thus realises that the

<sup>8</sup> However, there are philosophers who reject (*AP*) (see, e.g., Soames 2011).

machine is fake, produces a token of 'is here' at  $p$ . Again, Mary could not rule out by reasoning alone that her utterance is false.

The solution to the problem of a posteriori truths cannot simply be that the possibilities of time travelling and teleportation can, ultimately, be ruled out by ideal reasoning alone. Even if these possibilities could be ruled out in this way, it would not be trivial. Hence, it would not be trivial for Mary to rule out that her utterances of 'Now = now' and 'Here = here' are false. Again, it seems that the centered-worlds account cannot explain this. If two arbitrary tokens of 'now' and 'here', respectively, have the same primary intension, picking out the time/place marked at the center of any given scenario, then it should not be too difficult for Mary to rule out the possibility that her utterances of 'Now = now' and 'Here = here' are false.

An advocate of the centered-worlds account might object that Mary produces the two tokens of 'now' at different times and that therefore, her utterance of 'Now = now' is not true, but false. Such a solution presupposes that Mary uses her tokens of 'now' to refer to very short periods of time. However, 'now' can be used to refer to time periods of different lengths. For instance, with an utterance of 'Now it is raining in Stockholm', speakers usually refer to a much longer time period than with an utterance of 'Now he has finally passed the ball'.<sup>9</sup> Since, in our example, Mary has the intention to say something true with her utterance of 'Now = now', it is plausible to assume that she intends her uses of 'now' to refer to a somewhat longer time period, resulting in a true utterance of 'Now = now'.

It is also very unclear how such a solution could be extended to Mary's utterance of 'Here = here'. In that case, the two tokens of 'here' are certainly produced at the same place. Moreover, a problem similar to the problem of a posteriori truths also arises for false utterances of 'Now = now' and 'Here = here'. If two arbitrary tokens of 'now' and 'here' (respectively) have the same primary intension, picking out the time/place marked at the center of any given scenario, then an utterance of 'Now = now' or 'Here = here' should always be true at the scenario of utterance.

According to a variant of this solution, the center of the scenario of Mary's utterance of 'Now = now' contains two different time points which correspond exactly to the utterance times of the two tokens of 'now'. However, in order to account for the fact that 'now' can be used to refer to somewhat longer time periods, the primary

<sup>9</sup> This may then require that the center of the scenario contains time periods of different lengths.

intensions of the two tokens do not pick out these very time points. Rather, they pick out a time period containing the time of utterance of the respective token. While they assign the same time period to the tokens' utterance times at the scenario of utterance, there will be scenarios where this is not the case, providing an explanation of the fact that Mary's utterance of 'Now = now' is epistemically contingent.<sup>10</sup>

Again, there is no straightforward extension of the solution to Mary's utterance of 'Here = here'. After all, Mary produces the two tokens of 'here' at the same place. One possibility would be to say that the primary intension of a token of 'here' assigns a place to the ordered pair consisting of the time and the place of utterance of the token, resorting to the fact that the two tokens of 'here' in Mary's utterance of 'Here = here' are, strictly speaking, produced at different times.<sup>11</sup>

Ultimately, however, even this proposal fails to solve the problem. Take the example where two speakers produce a token of 'now' at the same time. Then, if one of the two speakers is sitting in a fake time machine (pushing the start button while producing the token of 'now'), an idealised speaker hearing the two utterances cannot know by ideal reasoning alone that the two tokens designate the same time. Chalmers' two-dimensional semantics has to provide an explanation of this fact. This time, however, the explanation cannot be that the two tokens of 'now' are produced at different times.

Alternatively, an advocate of the centered-worlds account could maintain that the two tokens of 'now' in Mary's utterance of 'Now = now' are indexed to the same time, but that the time points are not held fixed when evaluating Mary's utterance with respect to other scenarios. Thus, the center of the scenario of Mary's utterance of 'Now = now' contains one and the same time point twice, representing, respectively, the referent of the first and the second token of 'now'. Since there are scenarios where the two time points marked at the center differ from each other, the solution goes, there are scenarios where the primary intension of Mary's utterance of 'Now = now' is false. However, it is very unclear how this could be compatible with a centered-worlds account. If scenarios are centered worlds, then there has to be a time marked at the center of any given scenario providing

<sup>10</sup> In this solution, the time points to which the two tokens of 'now' are indexed are held fixed when evaluating Mary's utterance with respect to other scenarios.

<sup>11</sup> According to this solution, the place designated by a token of 'here' may again deviate from what can be considered the place of utterance of the token. However, the latter would be part of the former.

the information what time it is now. Since it should be expected that the primary intension of a token of ‘now’ picks out the time providing exactly this information, the centered-worlds account seems to be committed to the claim that two arbitrary tokens of ‘now’ have the same primary intension.<sup>12</sup>

An advocate of the centered-worlds account might respond that the primary intension of Mary’s utterance of ‘Now = now’ is akin to the primary intension of ‘Now = then’. According to such a solution, after Mary pushes the start button of the fake time machine, she makes an empirical discovery akin to a *Now = then* thought. Since this is the thought Mary wants to express with her utterance, the explanation goes, some kind of re-evaluation of the first token of ‘now’ takes place after she completes her utterance.<sup>13</sup> However, it is very unclear what it means for a token to be re-evaluated, and whether re-evaluation is compatible with compositionality, i.e. ( $T_2$ ). Furthermore, re-evaluation is less plausible if we look at the following exacerbation of the problem of a posteriori truths.

The example of Mary shows that every speaker who utters ‘Now = now’ has to rule out the possibility that they are sitting in a (real) time machine in order to know that their utterance is true. Since this possibility can only be ruled out via experience,<sup>14</sup> the example of Mary not only shows that there are a posteriori true utterances of ‘Now = now’, but that every true utterance of ‘Now = now’ is a posteriori true. However, if every true utterance of ‘Now = now’ is a posteriori true, then an advocate of the centered-worlds account seems to be committed to the claim that ‘Now = now’ is *typically* used to express *Now = then* thoughts.<sup>15</sup> This cannot be the result of some kind of re-evaluation. If an expression type  $e$  is typically used with a primary intension  $i$ , then  $i$  should be the conventional primary intension of  $e$ , i.e. the primary intension of  $e$  as an expression

<sup>12</sup> This would also speak against the above solution that the center of the scenario of Mary’s utterance of ‘Now = now’ contains two different time points which correspond exactly to the utterance times of the two tokens of ‘now’.

<sup>13</sup> This solution has been suggested to me by Chalmers in personal communication. In a similar way, it could explain that there are false utterances of ‘Now = now’, i.e. if the speaker produces the two tokens of ‘now’ at different times. For example, an advocate of Chalmers’ two-dimensional semantics could maintain that in the case of a false utterance of ‘Now = now’, the speaker starts to believe a false *Now = then* thought between the two utterances of ‘now’.

<sup>14</sup> Or at least it would not be trivial to rule out this possibility.

<sup>15</sup> Note that a false utterance of ‘Now = now’ would also express a *Now = then* thought.

type. Otherwise, the conventional meaning of the expression would be completely disconnected from its use.

For a centered-worlds account, this is problematic. According to such a conception of scenarios, the conventional primary intension of ‘now’ picks out the time marked at the center of any given scenario providing the information what time it is. Hence, if the primary intension of the complex expression (type) ‘Now = now’ depends compositionally on the primary intensions of its parts, then according to a centered-worlds account, it has a necessary primary intension. This seems to be incompatible with the fact that ‘Now = now’ can only be used to express a posteriori true (or false) *Now = then* thoughts, undermining the centered-worlds account.<sup>16</sup>

### 5. Concluding Remarks

According to Chalmers, the natural solution to the problem of indexicality, i.e. the question of how scenarios could best represent locating information, is to identify scenarios with centered worlds: ordered tuples of worlds, individuals, times, and places, with the individual, the time, and the place being the center of the world. A corollary of such a conception of scenarios is that two arbitrary tokens of ‘now’ have the same primary intension, picking out the time marked at the center of any given scenario. Against this, I have argued that every utterance of ‘Now = now’ is a posteriori true if true, suggesting that an advocate of Chalmers’ two-dimensional semantics has to come up with an alternative candidate for scenarios. Since identifying scenarios with centered worlds seems to be the natural solution to the problem of indexicality, this is no easy task.

The time machine example presented in this paper can also be used to exacerbate a problem discussed by Speaks (2020) in connection with an extension of Chalmers’ two-dimensional semantics known as *time-relativism*. Accordingly, the primary intension of a thought such as *Amelia is happy* determines different truth values with respect to different time-involving indices. As Speaks points out, *prima facie*, such an account has problems explaining that while the thought token ( $t_1$ ) is a priori true, the thought token ( $t_2$ ) is not.

( $t_1$ ) Amelia is happy if and only if Amelia is happy.

<sup>16</sup> This is also why the solution to the problem of a posteriori truths cannot simply be to restrict the two-dimensional semantics to expressions in contexts, which Kaplan (1989a and 1989b) calls *occurrences*. If ‘Now = now’ is typically used to express a posteriori truths or falsities, then this undermines the claim that occurrences of ‘Now = now’ are a priori true.

( $t_2$ ) Amelia is happy if and only if [waits a few hours] Amelia is happy.

According to Speaks, the obvious solution for time-relativism is to hold fixed the times to which the parts of ( $t_1$ ) and ( $t_2$ ), respectively, are indexed when evaluating the thoughts with respect to other scenarios. Since all of the parts of ( $t_1$ ) are indexed to the same times, ( $t_1$ ) will be true at every scenario and, thus, will come out a priori. The parts of ( $t_2$ ), on the other hand, are indexed to different times, which is why ( $t_2$ ) will be false at some scenarios.

However, using the time machine example, the problem for time-relativism can be further exacerbated. For example, while ( $t_1$ ) seems to be a priori true, ( $t_3$ ) is not when produced by our speaker in the time machine example.

( $t_3$ ) Amelia is happy if and only if [pushes the start button of the time machine] Amelia is happy.

Even the above variant of time-relativism cannot explain this. After all, both the parts of ( $t_1$ ) and the parts of ( $t_3$ ) are indexed to the same times. Hence, just like ( $t_1$ ), ( $t_3$ ) should be a priori.

A possible solution would be to index the parts of ( $t_1$ ) and ( $t_3$ ) to times without fixing them. This can be compared to the *Now = then* explanation in connection with a posteriori true utterances of ‘Now = now’. But then neither ( $t_3$ ) nor ( $t_1$ ) would be a priori. An advocate of Chalmers’ two-dimensional semantics could bite the bullet and argue that since even an agent who produces a biconditional thought such as ( $t_1$ ) has to rule out the possibility that they are sitting in a (real) time machine in order to know that their thought is true, biconditional thoughts such as ( $t_1$ ) are indeed a posteriori true if true. As we have seen in this paper, such a solution is less plausible when it comes to the problem of a posteriori truths for identity statements such as ‘Now = now’ and ‘Here = here’.

One of the main alternatives to Chalmers’ two-dimensional semantics is a directly referential account of singular terms such as proper names and indexicals, according to which sentences of the form ‘ $n$  is  $F$ ’ express singular propositions consisting of the referent of the proper name or indexical  $n$  and the property expressed by  $F$  (see, e.g., Salmon 1986, 1989, Braun 1998). While Chalmers’ two-dimensional semantics is committed to (*AP*), a directly referential account typically rejects it. For instance, the singular proposition expressed by ‘Hesperus = Phosphorus’ is often considered a priori

true, even though an idealised speaker cannot rule out by reasoning alone that ‘Hesperus = Phosphorus’ is false. By rejecting (*AP*) in this way, a directly referential account can block the problem of a posteriori truths presented in this paper, as it is not committed to the claim that Mary’s utterances of ‘Now = now’ and ‘Here = here’ are a posteriori true.<sup>17</sup>

What about Fregean theories of meaning, according to which the propositions we say and believe consist of modes of presentation of the objects, properties, and relations our thoughts and speech acts are about? Although Chalmers’ primary intensions are a possible conception of Fregean modes of presentation, this is by far not the only Fregean view on the market (see, e.g., Recanati 2012). Thus, the arguments presented in this paper do not necessarily speak against Fregean theories of meaning in general.<sup>18</sup> They rather suggest that Chalmers’ primary intensions cannot play the role of Fregean modes of presentation, which, among other things, should provide an explanation of the fact that with an utterance of ‘Now = now’ and ‘Here = here’, speakers can express empirical discoveries.<sup>19</sup>

## REFERENCES

- Almog, Joseph, John Perry and Howard Wettstein (comp.), 1989, *Themes from Kaplan*, Oxford University Press, Oxford.
- Berger, Alan (ed.), 2011, *Saul Kripke*, Cambridge University Press, Cambridge.
- Braun, David, 1998, “Understanding Belief Reports”, *Philosophical Review*, vol. 107, no. 4, pp. 555–595.
- Chalmers, David, 2011a, “Propositions and Attitude Ascriptions: A Fregean Account”, *Noûs*, vol. 45, no. 4, pp. 595–639.
- Chalmers, David, 2011b, “The Nature of Epistemic Space”, in Andy Egan and Brian Weatherson (comp.), 2011, pp. 60–107.

<sup>17</sup> Salmon 2024 seems to be a directly referential account that accepts (*AP*). However, there seems to be no reason why it cannot explain a posteriori true utterances of ‘Now = now’ in a similar way to a posteriori true utterances of ‘Hesperus = Phosphorus’, by resorting to epistemic possibilities in which the time of utterance of ‘Now = now’ is not identical with itself. But see Rinner 2024 and Chapter 3 in Rinner 2025 for an argument against directly referential accounts, which resorts to highly plausible principles regarding a priori knowledge that are independent of (*AP*).

<sup>18</sup> For an argument against Fregean theories in general, see Chapter 2 in Rinner 2025.

<sup>19</sup> I would like to thank David Chalmers for his comments on an earlier version of this paper.

- Chalmers, David, 2006, “Two-dimensional Semantics”, in Ernest Lepore and Barry C. Smith (eds.), 2006, pp. 575–606.
- Chalmers, David, 2004, “Epistemic Two-dimensional Semantics”, *Philosophical Studies*, vol. 118, no. 1/2, pp. 153–226.
- Chalmers, David, 2002, “On Sense and Intension”, *Philosophical Perspectives*, vol. 16, pp. 135–182.
- Chalmers, David and Brian Rabern, 2014, “Two-dimensional Semantics and the Nesting Problem”, *Analysis*, vol. 74, no. 2, pp. 210–224.
- Egan, Andy and Brian Weatherson (eds.), 2011, *Epistemic Modality*, Oxford University Press, Oxford.
- Frege, Gottlob, 1918–1919, “Der Gedanke. Eine Logische Untersuchung”, *Beiträge zur Philosophie des deutschen Idealismus*, vol. I, pp. 58–77.
- Frege, Gottlob, 1892, “Über Sinn und Bedeutung”, *Zeitschrift für Philosophie und philosophische Kritik*, vol. 100, pp. 25–50.
- Jackson, Frank, 1998a, *From Metaphysics to Ethics: A Defence of Conceptual Analysis*, Oxford University Press, Oxford.
- Jackson, Frank, 1998b, “Reference and Description Revisited”, *Philosophical Perspectives*, vol. 12, pp. 201–218.
- Kaplan, David, 1989a, “Demonstratives: An Essay on the Semantics, Logic, Metaphysics and Epistemology of Demonstratives and other Indexicals”, in Joseph Almog, John Perry, and Howard Wettstein (comps.), 1989, pp. 481–563.
- Kaplan, David, 1989b, “Afterthoughts”, en Joseph Almog, John Perry, and Howard Wettstein (comps.), 1989, pp. 565–614.
- Kripke, Saul, 1980, *Naming and Necessity*, Blackwell, Oxford.
- Lepore, Ernest and Barry C. Smith (eds.), 2006, *Oxford Handbook of the Philosophy of Language*, Oxford University Press, Oxford.
- Recanati, François, 2012, *Mental Files*, Oxford University Press, Oxford.
- Rinner, Stefan, 2025, *On Frege Puzzles: Why Propositions Are Not the Objects of Our Mental Attitudes*, Routledge, New York and London.
- Rinner, Stefan, 2024, “Direct Reference and the Goldbach Puzzle”, *Theoria*, vol. 90, no. 1, pp. 8–16.
- Salmon, Nathan, 2024, “From Modality to Millianism”, *Noûs*, online first: (<https://doi.org/10.1111/nous.12536>)
- Salmon, Nathan, 1989, “Illogical Belief”, *Philosophical Perspectives*, vol. 3, pp. 243–285.
- Salmon, Nathan, 1986, *Frege’s Puzzle*, MIT Press, Cambridge, Mass.
- Soames, Scott, 2011, “Kripke on Epistemic and Metaphysical Possibility: Two Routes to the Necessary A Posteriori”, en Alan Berger (ed.), 2011, pp. 167–188.
- Speaks, Jeff, 2020, “Galacticism, Thought-relativism, Quasi-internalism”, *Philosophical Studies*, vol. 178, no. 9, pp. 3037–3047.

*Received: March 15, 2025; accepted: September 14, 2025.*