

Chapter XXX

Remembering Dreams: Parasitic Reference by Minimal Traces in Memories from Non-Veridical Experiences

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Abstract Episodic memories are widely regarded as *factive*: Linguistic reports of a memory make the presupposition that it refers to an actually existent object and that the properties remembered of the object actually apply to it. Focusing on memories from perceptions – where factivity can indeed be assumed – the two main historical strands in the philosophy of memory, representationalism and relationalism, disagree, amongst others, over (i) whether memory reports should be construed as *de re* or *de dicto*, (ii) to what type of entity agents are directed when they episodically remember, and (iii) how the time gap between experience and remembering is bridged. However, what about memories from dreams or hallucinations, where factivity is violated? Here, we can still distinguish remembering from misremembering and confabulation. We show that the representationalist as well as the relationalist faces insurmountable problems in those cases. We develop a new account according to which reference in episodic memory is parasitic on the reference relation in the primary experience – the host attitude. Accordingly, we replace *de re* and *de dicto* analyses of memory reports with a *de hospite* analysis. Referential parasitism overcomes the problems of representationalism and relationalism. We argue that referential parasitism obviates the need to transmit representational content from experience to remembering, as postulated by the Causal Theory of Memory. Minimal traces without representational content suffice. Trace minimalism (Werning, 2020) paired with referential parasitism provides a uniform, non-disjunctivist explanation of remembering and misremembering from veridical and non-veridical experiences.

1.1 Introduction: Representationalism vs. Relationalism on Memory

The 18th-century Scottish philosopher and common sense realist Thomas Reid disagreed with the British empiricist John Locke not only about the nature of perception, but – as a consequence – also about the nature of memory. Locke (1975) held that

the immediate objects of perception are ideas. A perception, we might say in modern terms, is taken to be a representation with a propositional content of sorts: The object of a perception is some kind of proposition. In contrast, Reid (2002) maintained a direct-realist position about perception, according to which the objects of perception are located in the perceiver’s environment and the perceiver bears a relation of unmediated acquaintance to them. As Copenhaver (2017) has worked out, this controversy over a representationalist versus a relationalist view on perception leads Locke and Reid to contrary views on memory. Since, for Locke, ideas or – in modern terms – propositions are not ontologically dependent on the contemporaneous existence of the things in the environment of the perceiver at the time of perception, he arrives at a representationalist view of memory: Memory is conceived of as a “repository” where the mind “lay[s] up those ideas, which at another time it might have use of” (Locke, 1975, p. 150). The ideas laid up in the repository endow the mind with “a power, in many cases, to revive perceptions, which it once had” (Locke, 1975, p. 150). Locke’s view on memory can, with some right, be regarded as an early version of the Causal Theory of Memory (Martin & Deutscher, 1966; Bernecker, 2010): With the repository, we have both a carrier of representational content as well as a causal link between the event of perception and the event of remembering.

According to the representationalist view of memory originating with Locke, in remembering the subject is directed towards some kind of proposition about the event remembered. On the level of grammar, candidate constructions that might be – and have been – cited as evidence for this view are *that*-clause constructions like (1a) (Bernecker, 2010), gerundival small clause-constructions like (1b) (see D’Ambrosio & Stoljar, 2021), and, more recently, non-manner *how*-clause constructions like (1c) (see Liefke, 2023).

- (1) John took a stroll in the park and came across a tall birch tree. A week later,
- | | | |
|----------------|---|---|
| John remembers | { | a. that the tree was swaying in the wind. |
| | | b. the tree swaying in the wind. |
| | | c. how the tree was swaying in the wind. |

The adequacy of, and the differences between, the above constructions will be discussed in some detail in Section 1.2.

Semantically, representationalism with regard to memory can be captured by a *de dicto* construction as illustrated in the semi-formal paraphrase (2):¹

- (2) . . . John remembers in @ [λw . (the tree)-in- w is swaying in the wind in w]

With λ being a set-forming operator, the square-bracketed expression in (2) introduces the set of all possible worlds in which a counterpart of the tree exists, and in which it is swaying in the wind. The object of John’s remembering (in the actual world @) hence is a set of possible worlds that makes up a proposition.

¹ We are aware that, in the literature, wider and more narrow views of representationalism and a more sophisticated view of *de dicto* are available (Keshet, 2010; Blumberg & Lederman, 2021). However, for the purposes of our paper, we assume that representationalism and the *de dicto* analysis fully align.

On a representationalist analysis of memory, the object of remembering is ontologically independent of any particular, actually existing entity in the past or present environment of the remembering agent. For this reason, the direct realist Reid opposed a representationalist view of memory:

I remember the transit of Venus over the sun in the year 1769. I must therefore have perceived it at the time it happened, otherwise I could not now remember it. Our first acquaintance with any object of thought cannot be by remembrance. Memory can only produce a continuance or renewal of a former acquaintance with the things remembered. (Reid, 2002, p. 255)

In remembering, the agent – so Reid – stands in an acquaintance relation with the thing once perceived. This acquaintance relation is diachronic and, in some sense, parasitic on the acquaintance relation from the original perception. It nevertheless makes the object of remembering ontologically dependent on a particular entity (at least formerly) existent in the actual world. Semantically, relationalism with regard to memory can be captured by a *de re* construction, as shown in the semi-formal paraphrase (3):

(3) ... John remembers in @ [λw . (the tree)-in-@ is swaying in the wind in w]

In the relationalist analysis (3), the topic of the square-bracketed expression, i.e. *the tree*, is evaluated in the actual world. @ is a constant and thus not bound by the λ -operator.² This marks the main difference to the representationalist analysis (2), where *the tree* is evaluated in some (no particular) possible world, with w being a variable bound by the λ -operator.³ According to the relationalist analysis, the object of remembering is ontologically dependent on a particular, actually existing thing – the tree in John’s actual world. The set formed by the λ -operator merely comes to be an (intensional) property attributed to the actual tree.⁴

To establish the diachronicity of the relation between the event of remembering and the topic remembered, the relationalist might either also appeal to some causal

² In this paper, we use logical terms in an auto-referential way, foregoing any typographical distinctions between use and mention.

³ In (3), the hyphens in (the tree)-in-@ indicate that the definite description *the tree* is evaluated at the world @. The thus-obtained individual is then imported in the interpretation of the complement (at w , where interpretation is indicated without hyphens). This import can proceed through a rigidifying operator, analogous to Kaplan’s (1989) *dthat*.

⁴ To make this fully transparent, we recall that the formally explicit analysis, (3’), of (3) is – by existential generalization and the ι -operator’s existence and uniqueness condition – equivalent to (3’’) and – by β -reduction – equivalent to (3’’’). Subscripts signify the evaluation worlds of one-, two-, and three-place predicates:

(3’) $\exists e. \text{Remember}_@ (e, \text{john}, \lambda w. \text{SwayInTheWind}_w (\iota y. \text{Tree}_@ (y)))$

(3’’) $\exists x \exists e. (x =_@ \iota y. \text{Tree}_@ (y)) \wedge \text{Remember}_@ (e, \text{john}, \lambda w. \text{SwayInTheWind}_w (x))$

(3’’’) $\lambda x. (\exists e. \text{Remember}_@ (e, \text{john}, \lambda w. \text{SwayInTheWind}_w (x))) . \iota y. \text{Tree}_@ (y)$

The clauses (3’’) and (3’’’) give the standard *de re* analysis of attitude reports established in the literature (Keshet & Schwarz, 2019). Importantly, with the clauses being *de re*, the variable x in (3’’) and (3’’’) is not in the scope of λw . In (3’’), the third argument of the ternary predicate *Remember* is the in x open clause $\lambda w. \text{SwayInTheWind}_w (x)$, which denotes an intensional property.

connection between the two⁵ or might view the object to which the subject is related as a constituent of the remembering event.⁶ However, the question of how the relationship between the remembered object and the event of remembering should best be spelled out is one of the main themes of this paper and will be dealt with explicitly below.

The controversy between representationalism and relationalism has been addressed by contemporary authors mostly – and virtually exclusively – in the domain of perception (Sant’Anna, 2018; Schellenberg, 2014). It also has reverberations in the disjunctivism debate regarding the joint or disjoint kindhood of perceptions, hallucinations, and illusions (Fish, 2008, 2009). With regard to memory, representationalism and relationalism both face severe problems.

The most severe problem for representationalism seems to be that the associated *de dicto* analysis, (2), does not allow for a distinction between misremembering (as in (4)) and the (mnemonic) confabulation of past episodes (as in (5) and (6)):

- (4) On his visit to Berlin in 1990, Bill saw the quadriga on top of the Brandenburg Gate. After so many years, Bill misremembers the Nike on her chariot facing West. [The chariot in fact is directed Eastward, towards the old king’s palace, with the statue of the victory goddess looking in the same direction].
- (5) Four-year-old Bobby confabulates how his (imaginary) friend Tom played with him in the sandbox.
- (6) Being an alcoholic Korsakoff patient, Frank confabulates how his neighbor once beat him with a stick.

In each of these cases, the content of the mnemonic attitude is false. However, in the case of misremembering, e.g., (4), a property is wrongly attributed to a previously experienced object or event. Still, in misremembering, the mnemonic attitude is grounded in a past experience. Whereas in the case of confabulation, the mnemonic attitude is not grounded in a past experience, either because there was no such experience or the mnemonic attitude does not depend on that experience (Bernecker, 2017). As in the case of misremembering (4), in the cases of confabulation (5) and (6), the content of the mnemonic attitude is presupposed to be false: the object in (5), i.e., the friend Tom, or the event of being beaten with a stick in (6) does not at all exist. If the mnemonic attitude is directed towards a proposition, as in (2), the only obvious way to account for the falsity of the mnemonic content is to negate the proposition in its entirety.⁷ The distinction between misremembering and confabulation gets lost. An even more problematic case arises with confabulations whose contents happen to

⁵ For a more thorough elaboration on how to ground relationalism on some causal connection between the memory and its object, see Debus (2008).

⁶ Aranyosi (2021) denies the relationalist the possibility of conceiving the relation between the memory state and its object as a causal relation, rather than as a relation of constituency: “No theory of memory deserves the name ‘direct realist’ unless it adopts the idea that the relevant memory state is constituted by its object rather than caused by it.” (p. 10772).

⁷ Arguably, one could try to solve the above problem by separating questions regarding the reference of the embedded subject from the negation of the attributed property (e.g. in the spirit of Williams, 1983). However, this endeavor either faces serious compositionality problems (Liefke,

be true by accident. Again, representationalists have no obvious way to distinguish those cases from cases of genuine remembering.

Relationalism, on the other hand, seems incapable of accounting for memories from dreams or hallucinations. In the following two reports, we compare memories of veridical and of non-veridical experiences:

- (7) John took a stroll in the park and saw many tall trees. John remembers how a tree (from the park) was swaying in the wind. Talking to a friend, he tells him that it bore the sign of a natural monument.
- (8) Last night, John had a nightmarish dream involving weird looking men and women with attributes of wild animals. In the morning, he remembers how a woman (from his dream) was showing her tattoo. Talking to his family at breakfast, he tells them that she also had horns.

In the final sentences of (7) and, respectively, (8), the underlined pronouns anaphorically refer to entities introduced in the preceding discourses. Anaphoric reference is widely regarded as a test of reference. The anaphoric pronoun imports the referent of the antecedent expression into the successive discourse (Kamp & Reyle, 1993). In (7), the antecedent expression is the indefinite *a tree*, which refers to one of the trees in the park in the actual world. In (8), the antecedent expression is the indefinite *a woman*, which refers to one of the women from John's nightmare. In both cases, the antecedent expression is in the scope of the matrix verb *remember*. We take this as linguistic evidence that memories involve reference to previously experienced entities (or events), regardless of whether the underlying experience was veridical or non-veridical, as in the case of a dream. (Throughout the paper, we understand 'reference' in the wide sense. In contrast to reference in the narrow sense, the latter is not meant to imply the existence of a referent in the actual world).

Given that relationalism enforces a *de re* analysis of memory reports (as in (3)), relationalism has no obvious way to deal with cases of remembering based on dreams and hallucinations. Since dreams and hallucinations typically involve experiences of non-existent persons and objects, relationalism fails to provide the postulated acquaintance relation with the object of memory when the memory is based on an oneiric or hallucinatory experience.

As we will demonstrate in Section 1.5, the problems of representationalist and relationalist accounts of memory culminate in the case of misremembering dreams (or, *mutatis mutandis*, hallucinations), as in (9):

- (9) Last night, Leyla dreamt how she was riding on a horse ploughing a field. At her next therapy session, when asked by her shrink about the plants on the field, she misremembers that the plants were roses. [In fact, she had dreamt ploughing a field of sunflowers.]

2020) or is questionable from a syntactic point of view (van der Does, 1991). Our analysis of the distinction between misremembering and confabulation (provided in Section 1.7) faces neither of these problems.

When somebody misremembers the content of a dream, neither a *de dicto*, nor a *de re* analysis of the corresponding memory report captures the intuitive truth-conditions. To cope with the problem of reference in remembering and, in particular, misremembering, we will develop a theory of referential parasitism for secondary experiential attitudes in Sections 1.6 and 1.7.

Before we return to the problem of reference in (mis-)remembering, we will address three related issues: the distinction between semantic and episodic memory (Section 1.2), the factivity of episodic memory reports (Section 1.3), and the relationship between the Causal Theory of Memory and the Causal Theory of Reference (Section 1.4). In this context, we will already sketch the framework of trace minimalism (Werning, 2020) as an alternative to the Causal Theory of Memory. After having developed an account of referential parasitism for secondary experiential attitudes such as episodic memory, we will show how trace minimalism offers itself as a way to provide a naturalist, empirically motivated implementation of referential parasitism (in Sect. 1.8).

1.2 Reports of Episodic and Semantic Memories

An important distinction in the philosophy, psychology, and neuroscience of memory is that between episodic and semantic memory. Tulving (1972) conceived of semantic memory as general knowledge about oneself and the world and of episodic memory as memory of personally experienced events. In later works (Tulving, 1985), he tried to characterize episodic memory by a certain form of “autonoetic consciousness” (for a critical discussion of Tulving’s approach, see Cheng & Werning, 2016; for an overview of the various taxonomies in the realm of memory, see Werning & Cheng, 2017). Other authors, e.g., Bernecker (2010) have tried to classify different kinds of memory based on the grammatical type of the argument of the verb *remember*. The verb *remember* allows for a great variety of grammatical constructions in its argument position, ranging from (concrete and abstract) direct objects, gerundival and infinitival constructions, to *wh*- and *if*-clauses as well as to *that*-clauses as complementizer phrases (Werning & Cheng, 2017). Proponents of a grammar-based classification assume that the distinction between semantic/propositional and episodic/experiential memory is grammaticalized by the distinction between *that*-clause constructions and, respectively, gerundival constructions:

- (10) John remembers that the whole assembly burst into laughter when Karl entered the room.
- (11) John remembers the whole assembly bursting into laughter when Karl entered the room.

However, production data indicate that *that*-clause constructions like (10) are often also used to report cases of episodic memory (Zoellner et al., 2022). The gerundival construction, moreover, is rather particular to English and not possible (or strongly marked) in even closely related languages like German. Furthermore, the embedded

argument in (11) is ambiguous between a gerundival small clause and a direct object plus gerundival adjunct (D'Ambrosio & Stoljar, 2021). It is hence not clear whether (11) reports an instance of episodic or objectual remembering, as discussed by Openshaw (2022).

Recently, non-manner *how*-constructions have gained the attention of semanticists (Umbach, Hinterwimmer, & Gust, 2021; Liefke, 2023). In these constructions, the *how*-complement does not refer to a manner, way, or method of performing an action, but to a vividly experienced scenario. Non-manner *how*-constructions often occur with experiential attitude verbs including *remember*. Interestingly, *remember* plus non-manner *how*-complement is a good indicator for reports of episodic rather than semantic memory. This does not only hold for English (12), but also for German (13), French (14), and probably many other languages:

- (12) John remembers how the whole assembly burst into laughter when Karl entered the room.
- (13) John erinnert sich, wie die ganze Versammlung in Gelächter ausbrauch, als Karl den Raum betrat.
- (14) John se souvient comment toute l'assemblée a éclaté de rire lorsque Karl est entré dans la pièce.

Admittedly, many *how*-clause constructions are ambiguous between a manner- and a non-manner interpretation. This is the case for a minimal variant of (12), in (15). This variant can be interpreted as (15a) (non-manner interpretation) or as (15b):

- (15) John remembers how the whole assembly was laughing when Karl entered the room.
 - a. John remembers *the situation* in which the whole assembly was laughing when Karl entered the room.
 - b. John remembers *the manner* in which the whole assembly was laughing when Karl entered the room, viz. loudly and indignantly.

To separate (15a) from (15b), researchers have proposed a number of diagnostics that signal salient non-manner readings of *how*-clause constructions. These include (i) the possibility of modifying the matrix verb (above: *remember*) in these reports by an 'experiential' adverb like *vividly* or *in perfect detail* (Liefke, 2023; based on Stephenson, 2010), (ii) the possibility of substituting the complement in these construction with an expression of the form *a/the situation in which* [_{TP}] (see Umbach et al., 2021), and the possibility of expressing the agent's perspective through a viewpoint adjunct (e.g. *from the point of view of* . . .) or a locative modifier (e.g. *from above*; cf. Vendler, 1979; D'Ambrosio & Stoljar, 2021). Diagnostics for non-manner interpretations further include (iv) the entailment of these constructions to sentences that relate the agent's direct experience of the event that is described by the complement (Liefke, 2023; based on Stephenson, 2010). For (12), these diagnostics are illustrated in (16). In these illustrations, the diagnostically relevant expressions are marked in italics:

- (16) a. John *vividly* remembers how the whole assembly burst into laughter when Karl entered the room.
 b. John remembers *the situation* in which the whole assembly burst into laughter when Karl entered the room.
 c. John remembers how the whole assembly was laughing *from Karl's perspective / from the perspective of an assembly member*.
 d. (12) \leadsto John was there and had experienced it live.

Liefke (2023) has taken the above to argue that non-manner *how*-constructions do not express a relation to a proposition, but presuppose an informationally richer scenario that involves sensual (visual, auditory, etc.), emotional, and agential aspects. The episodic character of this relation is evidenced by the possibility of combining *remember* with an experiential modifier such as *vividly* (Stephenson, 2010).

Interestingly, the above are exactly the characteristic features of scenarios in the sense of the scenario construction framework of episodic memory proposed by Cheng, Werning, and Suddendorf (2016). Scenarios are spatio-temporally extended objects that contain objects and events with their properties and relations. They may involve an experiential perspective, which may be first-person or third-person and might sometimes even be more complex (Peeters, Cosentino, & Werning, 2022; Jainta et al., 2022; McCarroll, 2018; Liefke & Werning, 2021). In terms of semantics, we will thus assume that the object of an episodic remembering is an informationally depleted spatio-temporal part of a possible world (i.e. a situation, in the terminology of Liefke & Werning, 2018, Kratzer, 2002, and Barwise & Perry, 1983), rather than a set of possible worlds, as in (2) and (3). To capture the presence or absence of a first-person perspective on a scenario, this object may come with or without a *de se* center (Liefke & Werning, 2021). To semantically construct the object of episodic remembering, we will replace the set-forming operator λ as used in (2) and (3) – with $\lambda w. p \text{ in } w$ reading “the set of worlds/scenarios w such that p is the case in w ” – by the choice operator η – with $\eta w. w \in p$ reading “some world/scenario w such that p is the case in w ”.

1.3 Factivity Presuppositions

Episodic memory reports in ordinary contexts are widely assumed to be factive: In asserting that somebody (episodically) remembers something, we make the presupposition that the attributed content is true. In this respect, *remember* aligns with perceptual verbs like *see*, *hear*, and *feel*. Applying the distinction between topic and comment from information structure theory (Krifka, 2008; Reinhart, 1982), the presupposition of factivity can be split into two separate presuppositions:

Existential Import (ExImp). The topic of the attributed content has a referent that/who exists in the actual world.

Congruence (Cong). The comment of the attributed content is satisfied by (i.e., true of) the referent of the topic.

The topic of a sentence or clause is what is being talked about, and the comment is what is being said about the topic. In languages like English, the topic typically – but not necessarily – corresponds to the grammatical subject and the comment to the predicate. Other languages such as Japanese use specific topic markers. The notions of topic and comment are illustrated on the example of a non-manner *how*-clause with *see*, *dream*, *remember*, or *imagine* in (17):

- (17) John $\overbrace{\text{sees / dreams / remembers / imagines}}^{\text{matrix verb}}$ $\overbrace{\text{how a tree is/was swaying in the wind.}}^{\text{complement / attitude content}}$
- $\underbrace{\text{how a tree}}_{\text{topic}}$ $\underbrace{\text{is/was swaying in the wind.}}_{\text{comment}}$

In the case of perceptual as well as memory verbs, factivity is (probably) a soft pragmatic presupposition (Abrusán, 2011, 2016), where either of the two components, Existential Import and Congruence, can be cancelled. Factivity is a presupposition, rather than an entailment because it projects out of downward-entailing contexts (e.g. negations or antecedents of conditionals) even when the argument is a non-manner *how* construction. That is, from (18) or, respectively, (19), one is licensed to infer (20):

- (18) John does not remember how a tree in the park was swaying in the wind.
 (19) If John remembers how a tree in the park was swaying in the wind, he will tell his friends.
 (20) A tree in the park was swaying in the wind.

Moreover, the presuppositions of both Existential Import and Congruence can be cancelled separately and are, hence, soft and independent from one another:

- (21) Pete remembered how eagles were flying over his head. But, in fact, they occurred only in his dream. (~~ExImp~~)
 (22) Fiona remembered how the moon was getting larger on the horizon. But, in fact, it was just an illusion. (~~Cong~~)

1.4 Reference and Memory: Combining Two Causal Theories?

We have mentioned above that representationalists and at least some relationalists (e.g., Debus, 2008) may want to bridge the time gap between the experience of a scenario and the memory thereof by appeal to a causal link between the event of experience and the event of remembering. Representationalist invoke a “repository” – as Locke put it – that stores a representation of the scenario. Relationalist need to explain the “continuance of the acquaintance” – in Reid’s words – with the

remembered object or event in the world. The Causal Theory of Memory introduced by Martin and Deutscher (1966) seems to offer itself as an answer to those demands (see also Bernecker, 2010) since it postulates a memory trace that provides a causal connection between the experience event and the remembering event:

To remember an event, [persons] must not only [accurately] represent and have experienced it, but also [their] experience of it must have been operative in producing a state or successive states in [them] finally operative in producing [their] representation. (Martin & Deutscher, 1966, p.173)

However, the Causal Theory of Memory as proposed by Martin and Deutscher (1966) also assumes that the memory trace carries representational content:

The state or set of states produced by the past experience [i.e., the memory trace] must constitute a structural analogue of the thing remembered, to the extent [they] can accurately represent the thing. (Martin & Deutscher, 1966, p. 191)

Although Martin and Deutscher’s proposal is commonly referred to as ‘the Causal Theory’, it is not just a *causalist* theory, because they require the memory trace moreover to constitute a “structural analogue” of “the thing remembered”, such that the memory trace serves as a representation thereof. The requirement of being a structural analogue is tantamount to there being a homomorphous mapping from the structure of the representational carrier to the structure of its representational content.⁸ As has been pointed out elsewhere, this homomorphism amounts to the memory trace representing content in a *compositional* and *categorical* way (Werning, 2020). It is with this qualification that we will hereafter use the term ‘representation(al)’.

As was noted by epistemologists in the rise of causalist theories of justification, one has to build in a condition of reliability in order for causal processes to lend justification to beliefs (Goldman, 1979). One so ensures that counterexamples of deviant or accidental causation are avoided (Plantinga, 1993; Michaelian, 2011) and the goal of truth is pursued (Werning, 2009). With this amendment of reliability, the notion of memory traces proposed by the Causal Theory of Memory can be summarized by the following features (Werning, 2020):

Causal Link. Memory traces constitute a causal link between the remembering of a scenario and the past experience of the scenario.

Representational Content. Memory traces are carriers of categorical and compositional representational content.

Content Preservation. The content of a memory trace is (at least partially) contained in the content of the experience and itself (at least partially) contains the content of the remembering.

Reliability. Memory traces are operated in a truth-approximating reliable way by the person’s (neurobiological) system.

⁸ Bernecker (2010) even interprets ‘structural analogue’ as there being an isomorphous mapping, which in our eyes, however, is too strong.

Postulating memory traces that provide a causal link between experience and remembering, and carry over representational content from the former to the latter, the Causal Theory of Memory is fully in line with Locke's representationalism – such a memory trace is just what Locke means by a “repository” of “ideas”. Reid's relationalism, in contrast, seems to require a causal link to warrant the continuance of the acquaintance relation, but does not entail that a memory trace carries over representational content from experience to memory. Relationalists may want to thrive for a theory of memory without representational memory traces.

When it comes to the question of how reference in memory is established, the Causal Theory of Memory seems to have a natural ally in the Causal Theory of Reference in mental representation. Causal theories of reference in language were first developed for proper names. Kripke (1980) argued that, in order to use a name successfully to refer to something, what matters is not that one possesses a uniquely and correctly identifying description of that thing, but one's use of the name must be causally linked to that thing by an appropriate causal(-historical) chain of reference to that thing, beginning with the initial naming event. Lewis (1984) pointed out that a minimal descriptive apparatus needs to be added to the causal relation between speaker and referent. The idea to establish reference relations through a causal connection to referents has been extended to natural kinds (Kripke, 1980; Devitt, 1991) and substances (Millikan, 1998). Fodor's (1992) causal-informational theory of conceptual content can be regarded as an application of some version of the causal theory of reference to the domain of mental representation. For the purposes of this paper, we will – without defending it – define the ‘Causal Theory of Reference’ as maintaining that reference of a mental representation to an object is warranted just in case the following conditions are fulfilled:

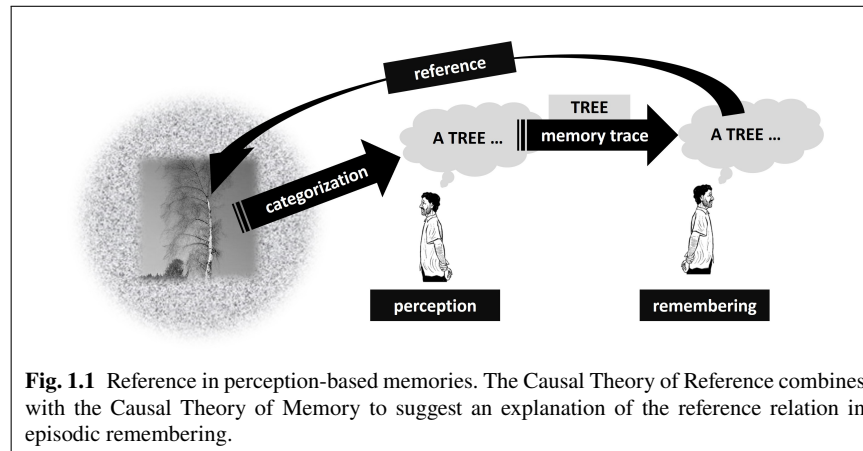
Causal Connection. Some process or a succession of processes warrants an uninterrupted causal connection between the object in question and the mental representation.

Categorization. The object is categorized as falling under a particular category by some properly functioning mechanism.

Transmission. The categorial content is reliably preserved by some causal process.

Categorization and, consequently, transmission of categorial content have been defended as necessary for reference since a causal chain itself does not unambiguously identify the referent: Is it the object, the surface, the substance, the color, or even a weirder ontological entity that one refers to by the concept *lemon* (e.g., Quine, 1960; Werning, 2004)? The Causal Connection is also regarded as necessary since categorial information alone does not uniquely identify the referent: There may always be a twin object that falls into exactly the same categories. Causal theories of reference have also faced a number of objections that have led to alternative theories, such as descriptivist, intentionalist, and hybrid theories of reference (for review, see Michaelson & Reimer, 2022).

In cases of perception-based memories, the Causal Theory of Memory combines well with the Causal Theory of Reference to establish reference of the mnemonic topic: The external object causes stimulations of the sense organs. In perception, a



categorization mechanism processes these sensory signals and establishes a causal-categorial reference relation between the event of perception and the external object. The categories attained in perception may enter into a more complex compositional representation of the external scenario. The memory trace transduces the causal link between the perception and the object perceived. It so establishes a causal link between the topic of the perception and the event of remembering. Being also a carrier of representational content, the memory trace, moreover, transmits the needed categorial information over time. The requirements of the Causal Theory of Reference for the memory to refer to the remembered object seem to be fulfilled. A schematic illustration is given in Figure 1.1.

The Causal Theory of Memory has been criticized on empirical as well as theoretical grounds, which have been reviewed elsewhere (Michaelian, 2016; Werning, 2020). The criticism from psychology has been summarized by Schacter and Addis (2007) as follows:

[Remembering] is not a literal reproduction of the past, but rather is a constructive process in which bits and pieces of information from various sources are pulled together. (Schacter & Addis, 2007, p.773)

Constructivist views of episodic memory have thus become predominant in psychology (for review: Roediger & DeSoto, 2015; Michaelian & Robins, 2018). In philosophy, proposals that dispense with representational memory traces have been developed. The most radical one in simulationism (Michaelian, 2016), which rejects the need even of a causal connection between experience and remembering; it even rejects the need for having experienced the remembered event in the past at all. Radically enactivist positions try to account for memory without assuming that the subject has any representations, not even during the ongoing event of remembering itself (Hutto & Peeters, 2018). Perrin (2018) has developed a procedural view of episodic memory. Recurring on Reichenbach's (1956) Common Cause Principle, which states an intimate relationship between causation and probabilistic dependence

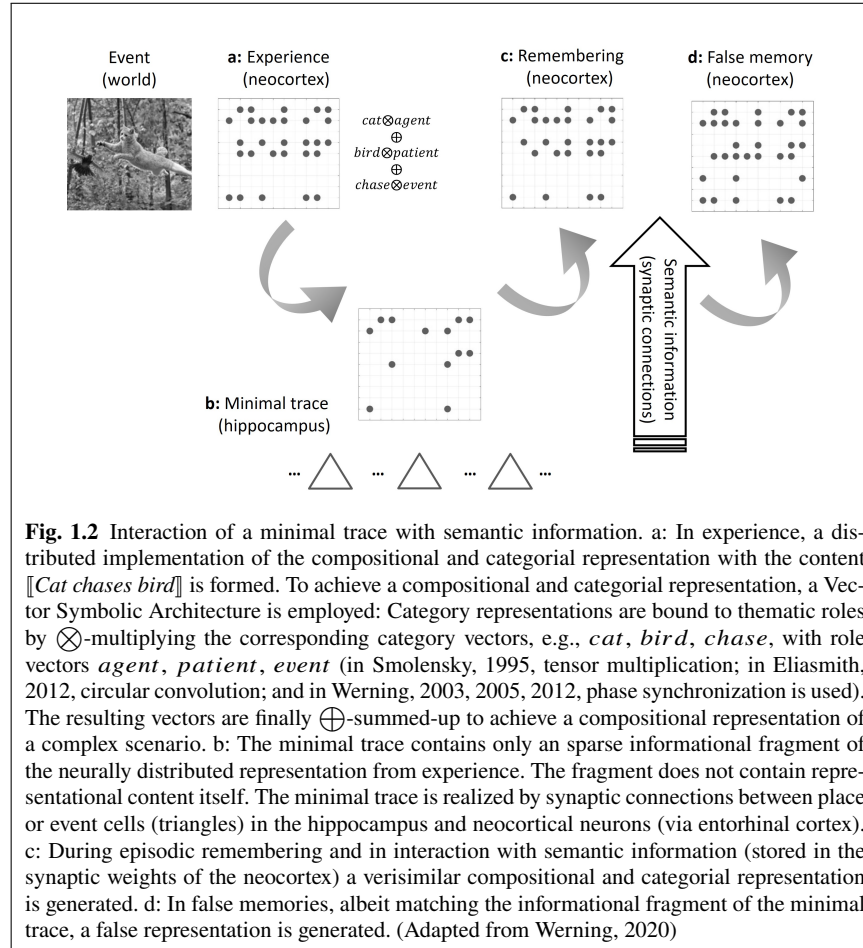


Fig. 1.2 Interaction of a minimal trace with semantic information. a: In experience, a distributed implementation of the compositional and categorical representation with the content $\llbracket \text{Cat chases bird} \rrbracket$ is formed. To achieve a compositional and categorical representation, a Vector Symbolic Architecture is employed: Category representations are bound to thematic roles by \otimes -multiplying the corresponding category vectors, e.g., *cat*, *bird*, *chase*, with role vectors *agent*, *patient*, *event* (in Smolensky, 1995, tensor multiplication; in Eliasmith, 2012, circular convolution; and in Werning, 2003, 2005, 2012, phase synchronization is used). The resulting vectors are finally \oplus -summed-up to achieve a compositional representation of a complex scenario. b: The minimal trace contains only a sparse informational fragment of the neurally distributed representation from experience. The fragment does not contain representational content itself. The minimal trace is realized by synaptic connections between place or event cells (triangles) in the hippocampus and neocortical neurons (via entorhinal cortex). c: During episodic remembering and in interaction with semantic information (stored in the synaptic weights of the neocortex) a verisimilar compositional and categorical representation is generated. d: In false memories, albeit matching the informational fragment of the minimal trace, a false representation is generated. (Adapted from Werning, 2020)

(Hitchcock & Rédei, 2021). Werning (2020) has argued that a causal link between experience and remembering is required to warrant the reliability of episodic memory. The resulting position is Trace Minimalism: Minimal traces provide a causal link to experience, but do not carry representational content.

In line with neurocomputational models (Fayyaz et al., 2022), Werning (2020) shows a way of how truth-approximating reliability can still be achieved. Assuming that a categorical and compositional representation from experience is realized in a widely distributed pattern of neural activity, a sparse fragment of this neural distribution, which, over time, is synaptically linked to a minimal hippocampal trace, but itself does not have any categorical and compositional representational content, suffices to generate a “prediction of the the past” in remembering. To achieve this, Trace Minimalism builds on an analogy to the predictive processing framework known from the theory of perception (Hohwy, 2013; Friston & Kiebel, 2009). As,

in perception, an informationally sparse, non-representational sensory trace serves as an error signal for a top-down predictive model of the present based on learned statistical regularities, in remembering the minimal hippocampal trace serves as an error signal for a top-down predictive model of the past, based on learned statistical regularities, i.e. semantic information (for a schematic illustration see Figure 1.2).

It has, moreover, been pointed out that the Causal Theory of Memory cannot explain the epistemic generativity of episodic memory (Mahr & Csibra, 2018; Werning & Cheng, 2018). Given that the content to be remembered event is already represented in the memory trace, no new justification for hitherto unjustified or inexistent beliefs can be obtained through remembering. Furthermore, storing all (or most of) the content that could possibly be remembered episodically would not only lead to an information overkill, but would leave unexploited the abundant statistical regularities in the world that individuals have learnt and stored as semantic information anyway. The Causal Theory would thus imply a massive informational redundancy. Due to an overfitting effect, faithful preservation might even lead to worse predictions in the future (Richards & Frankland, 2017).

However, the problem we would like to address in this paper, is that the Causal Theory of Memory cannot recur to the Causal Theory of Reference to explain reference in episodic memories, when the original experience was not a perception, but a dream or a hallucination. Moreover, as we will show below, the assumption of a memory trace carrying representational content does not add anything to an explanation of reference in memories from dreams and hallucination that a minimal trace, which does not carry representational content, would not also be able to explain.

1.5 The Problem: Reference in Memories from Dreams and Hallucinations

From the point of view of the Causal Theory of Reference, and, *a fortiori*, its combination with the Causal Theory of Memory, the problem of reference in dreams and, *a fortiori*, the problem of reference in memories from dreams is an obvious one: The things and events we dream of typically do not exist in the actual world and hence do not enter into causal relations with our neurobiological system. Moreover, since an oneiric object, e.g., the woman with the tattoo from John's dream in example (8), does not enter into a causal relation with one's, here John's, neurobiological system, there is no causal connection between the dream object and the event of dreaming that could be transduced by a memory trace. There is hence no causal connection from the dream object to the memory of it. The combination of the two causal theories – of reference and of memory – therefore fails to explain the reference relation in memories from dreams. This is so despite the fact that we do find reference (in the wide sense) in reported memories from dreams, as we saw in the discussion of example (8). Note that the question is not how to remember that you had a dream or

that you dreamt of a woman with a tattoo. The relevant remembering can thus not be reported by (8)′:

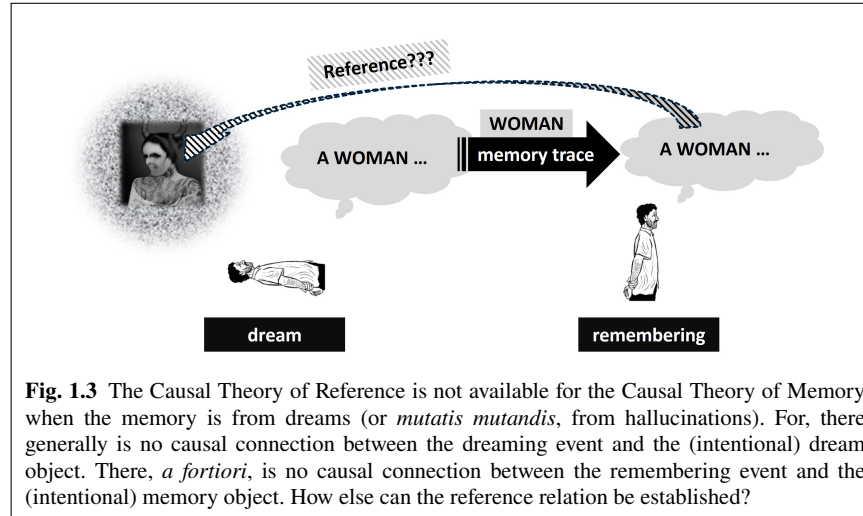
(8)′ John remembers dreaming how a woman was showing her tattoo.

In example (8), the object of reference is the woman with a tattoo in the dream content, rather than the event of dreaming. The analogous problem, *mutatis mutandis*, arises for memories from hallucinations. The problem is graphically illustrated in Figure 1.3.

We have seen above that, for the relationalist on memory, an explanation of reference in memories from dreams/hallucinations is immediately ruled out. So what does the failure of a combination of the Causal Theory of Memory with the Causal Theory of Reference imply for the representationalist on memory? One option would be to abandon the Causal Theory of Reference altogether both with respect to memories from perceptions and memories from dreams/hallucinations, that is, regardless of whether the memory is based on a veridical or a non-veridical primary experience. Representationalists might, e.g., opt for a descriptivist theory. However, in doing so, they would expose themselves to many of the well-known Kripkean arguments against descriptivism. Intentionalist theories are also riddled with a bunch of problems as soon as one attempts to naturalize them and misses the ability to recur to some causal-informational story of content.

The other option would be to go disjunctivist on memory – even though, disjunctivism has almost exclusively been discussed for primary experiences such as perception and hallucinations (for review see Soteriou, 2016). This would mean to restrict an explanation of reference in terms of the Causal Theory of Reference to cases where the memory is based on a veridical experience. In cases of memories from dreams/hallucinations, disjunctivists could then choose either a descriptivist or an intentionalist explanation of reference. The problem with disjunctivism in the theory of memory is that it would imply that episodic/experiential memories could no longer be regarded as a natural kind, regardless of whether the foregoing experience was veridical or not. For us, disjunctivism on memory is not a viable option since we have argued elsewhere (Cheng & Werning, 2016) that, in the light of psychological and neuroscientific evidence, episodic memory should be regarded as a natural kind, because instances of episodic memory share a uniform underlying causal process – hippocampal replay (Colgin & Moser, 2006).

What speaks against representationalism about memory, moreover, is that the Causal Theory of Memory itself is highly problematic. In section 1.4, we have briefly reviewed the empirical and theoretical grounds against the Causal Theory of Memory. In light of the failures of both, relationalism and representationalism, we will now turn to developing our own account of episodic memory and reference therein. Our theory unites two components: Referential Parasitism and Trace Minimalism. It avoids the shortcomings both of the Causal Theory of Memory and of the Causal Theory of Reference as applied to memory. Moreover, we will show that relationalism and representationalism also face a virtually insurmountable problem when it comes to the semantic analysis of memory reports and, especially, reports of misremembering from dreams. To solve this problem, we provide an analysis of memory reports



that combines Trace Minimalism with Referential Parasitism. We will show that the result of this combination enables a comprehensive analysis of remembering, misremembering, and confabulation.

1.6 The Phenomenon: Parasitic Mnemonic Reference

We argue that all cases of episodic remembering depend, for their reference, on another attitude or experience. In semantics and the philosophy of language, such dependence is sometimes called *attitudinal parasitism* (Blumberg, 2019; Maier, 2015). The parasitic dependence of an attitude effects that “one cannot provide a complete characterization of the content [of this attitude] without appealing to the content of [another attitude or experience]” (Blumberg, 2019, p. 4). To make this dependence explicit, we will hereafter call the dependent attitude the *parasite* (or *parasite attitude*; following Maier, 2015, 2017). We call the underlying attitude (or experience) the *host*.

Attitudinal parasitism is not a new phenomenon. However, following Karttunen (1973) and Heim (1992), its investigation has focused on doxastic parasitism (i.e., the parasitic dependence of desires on the agent’s *belief*). This kind of parasitism is exemplified in (23) (modelled on Blumberg’s (2018) ‘burgled Bill’-example).

- (23) Context: Bill wrongly ^{host}*believes* that a man robbed Suzy.
 (What really happened: Suzy had misplaced her laptop, and did not want to admit this to Bill.)

- a. Bill wishes that he / the man had not robbed Suzy.
- $\underbrace{\hspace{10em}}_{\text{parasite}}$
 $\underbrace{\hspace{10em}}_{\text{host}}$
- ≡ b. Bill wishes that the man *of whom Bill believes that he had robbed Suzy* had not robbed Suzy.

Note that (23b) is the only analysis of (23a) that gives plausible truth-conditions. In particular, given the context from (23), (23a) is false on both its (relationalist) *de re* and its (representationalist) *de dicto* analysis: The *de re* analysis (in (24a)) assumes that there exists a particular man in the actual world, @, who robbed Suzy – contrary to the assumption that Suzy was, in fact, not robbed. The *de dicto* analysis (in (24b)) places Bill in the wishing relation to a contradictory proposition, viz. that the same man simultaneously has and has not robbed Suzy.

- (24) a. *de re*: There exists a specific man in @ (viz. Suzy's robber) (X)
 of whom Bill wishes that he / this man had not robbed Suzy.
- b. *de dicto*: The object of Bill's desire has an inconsistent content, (X)
 viz. that some man both robbed and did not rob Suzy.
- c. *de hospite*: Bill wishes that the man *whom he believes to have* (✓)
 robbed Suzy had not robbed Suzy.

The parasitic analysis of *wish* in (23a) is then prompted by the observation that (23a) has plausible truth-conditions on an analysis that evaluates *he / the man* at some other world that is different both from the actual world @ and from Bill's wish-worlds (see (24c)). The name for this analysis, i.e. *de hospite*⁹ (due to Liefke & Werning, 2021), is motivated by the observation that this world is associated with the host experience, on which the matrix attitude (here: Bill's wishing) is parasitic. In (25c), the 'host' world is denoted by *X*:

- (25) a. Bill wishes in @
 [λw . (the man who robbed Suzy)-in-@ did not rob Suzy in *w*]
- b. Bill wishes in @
 [λw . (the man who robbed Suzy)-in-*w* did not rob Suzy in *w*]
- c. Bill wishes in @
 [λw . (the man who robbed Suzy)-in-*X* did not rob Suzy in *w*]

To specify the particular world(s) at which the different elements of the *that*-clause in (23a) are evaluated, (25) uses Percus' (2000) *Index Variables-approach*. This approach posits possible world-variables in the representation of syntactic structures, and allows intensional operators (here: the attitude verb *wish*) to bind these variables. In particular, Percus' approach assumes that all predicates contain an unpronounced variable which saturates their world-argument. It further assumes that the attitude verb is associated with a lambda abstractor (intuitively: set formation) that can bind

⁹ In (Yanovich, 2011), a belief-specific version of this analysis is called the *de credito* analysis.

a world variable. The ability of the same world variable in a syntactic structure to be bound by different lambdas then accounts for different analyses.

Like our analyses in (2) and (3), the analyses in (25) only assume a single world-variable, w , next to our variable for the actual world, $@$. To capture our observation that the elements of the *that*-clause in (24a) depend on different worlds, we follow (Blumberg, 2018) in positing distinct variables for the alternatives that are introduced by the parasite attitude (in (23): Bill’s wishing), w_2 , and for the alternatives that are introduced by the host (in (23): Bill’s beliefs), w_1 . The different analyses of the *wish*-report in (23a) are then given in (26). The relevant analysis – on which (23a) is true – is given in (26c).

- (26) Bill wishes in $@$. . .
- a. $[\lambda w_1 [\lambda w_2. (\text{the man who robbed Suzy})\text{-in-}@ \text{ did not rob Suzy in } w_2]]$
 - b. $[\lambda w_1 [\lambda w_2. (\text{the man who robbed Suzy})\text{-in-}w_2 \text{ did not rob Suzy in } w_2]]$
 - c. $[\lambda w_1 [\lambda w_2. (\text{the man who robbed Suzy})\text{-in-}w_1 \text{ did not rob Suzy in } w_2]]$
- (the designator of) a paired proposition

Note that, of the analyses in (26), only (26c) makes non-trivial use of w_1 : The λ -term in (26c) denotes a function that sends the host world, w_1 , to a proposition/set of possible worlds that depends on w_1 . This dependence explains why the *de hospite*-reading of (23a) cannot be expressed through the familiar semantic tools (e.g., through (25a) or (25b)).

Our previous discussion has focused on an attitude’s dependence on the agent’s *belief*. Unsurprisingly, mental states can also depend on the agent’s other experiences (e.g., perception, hallucination, dreaming). Since the targets of these experiences (e.g., the agent’s visual or oneiric scene) provide the referent of the topic in the report’s complement (as we have argued in Sect. 1.3), we hereafter refer to this dependence as *referential parasitism*. Referential parasitism is already witnessed by our paraphrases in (7) and (8). The literature on parasitic attitudes even contains some (few) cases of referential parasitism. The latter include Ninan’s (2012, p. 5:18) example from (27) and Blumberg’s (2019, p. 97, ex. (102)) example from (28):

- (27) Ralph is imagining that the man whom he *sees* sneaking around on the waterfront is flying a kite in an alpine meadow.
- (28) Last night, John *dreamt* that he was being threatened by a woman. Now John is imagining that the woman who threatened him [in his *dream*] is swimming in the sea.

In (27) and (28), the parasitic behavior of the reported attitude (there: imagining) is made explicit by the presence of predicates for the host experience (there: *see* resp. *dream*). However, a parasitic analysis can also be triggered in the absence of such predicates. To see this, consider the close analogue of (23)/(24) in (29). Since we are interested in attitude reports that only have plausible truth-conditions on their *de hospite*-readings – and since veridical experience-based memory reports are

already true on their relational / *de re*-readings (see (3)) –, we use the example of misremembering:¹⁰

- (29) *Context:* Yesterday, John $\overset{\text{host}}{\text{dreamt}}$ how a woman was showing her tattoo.
- a. (Now,) He $\underbrace{\text{misremembers}}_{\text{parasite}}$ how she / the woman was presenting her clear skin [= without tattoos].
- ≡ b. $\underbrace{\text{John misremembers how the woman from his dream was presenting her clear skin (in his false memory)}}_{\text{parasite}}$

In virtue of the context from (29) and the use of contradictory predicates (viz. *show her tattoo* vs. *present her clear [= non-tattooed] skin*), (29a) only has plausible truth-conditions on its *de hospite* analysis (in (30c)). This analysis has the same form as the analysis in (24c)/(26c):

- (30) John falsely remembers in @ . . .
- a. [λw_1 [λw_2 .
(the woman w. tattoos)-in-@ presented her clear skin in w_2]]
[≡ There exists a specific woman with tattoos in @ whom John (falsely) remembers as presenting her clear skin] (X)
- b. [λw_1 [λw_2 .
(the woman with tattoos)-in- w_2 presents her clear skin in w_2]]
[≡ John's memory has an inconsistent content, viz. that some woman simultaneously shows her tattoo and clear skin (in the same spot)] (X)
- c. [λw_1 [λw_2 .
(the woman with tattoos)-in- w_1 presented her clear skin in w_2]]
[≡ John falsely remembers that the woman from his *dream* was presenting her clear skin (in the same spot)] (✓)

Note that, like Blumberg's analysis of (24c), our analysis of the *de hospite*-version of (29a) leaves the host attitude / experience unspecified: just like there is nothing in (26c) that identifies w_1 as one of John's doxastic alternatives [= belief worlds], there is nothing in (30c) that identifies w_1 as one of John's oneiric (or more generally, experiential) alternatives [= experience or dream worlds]. We will discuss this specification in more detail in the next section.

¹⁰ For a distinction between different kinds of episodic remembering – and of different kinds of *failed* remembering –, the reader is referred to Section 1.7.

1.7 A Formal Account of Referential Parasitism

We have suggested above that, to capture the dependent content of secondary experiential attitudes, we need to enrich the familiar apparatus of worlds – which includes the actual world, @, and parasite attitudinal alternatives, w_2 (in (30): John’s false-memory worlds) – with host experience worlds, w_1 (in (30): John’s dream worlds). We have also pointed out that, in cases of referential parasitism (e.g. (27)–(29)), the topic of the attitude complement (typically, the embedded subject; in (29a)/(31a): *she / the woman*) is interpreted at the host world w_1 . In contrast, the comment (typically, the embedded predicate; in (29a)/(31a): *presents [her] clear skin*) is interpreted at the matrix/parasite world, w_2 (see (31)):

- (31) a. $\overbrace{\text{John misremembers}}^{\text{matrix verb}} \underbrace{\text{how the woman was presenting her clear skin.}}_{\text{complement / attitude content}}$
 $\overbrace{\text{how the woman was presenting her clear skin.}}^{\text{topic comment}}$
 b. $[\lambda w_1 [\lambda w_2. (\text{the woman w. tattoos})\text{-in-}w_1 \text{ presented her clear skin in } w_2]]$

The interpretation of the topic at w_1 is required by the need to account for the felicitous use of the definite determiner (i.e. *the*) in *the woman*: We can only use this determiner if this expression’s referent has been introduced in the previous discourse (see, e.g., Heim, 1982). The latter is the case if John has previously encountered this referent, such that he stands in an acquaintance relation to the referent. This acquaintance can be from veridical perception (thus allowing for a relational/*de re* analysis) or from some non-veridical experience (thus requiring the special *de hospite* analysis).

The interpretation of the comment at w_2 is demanded by Percus’ (2000) *Generalization X*. The latter demands that the world variable that a verb selects for must be co-indexed with the nearest lambda above it. This constraint excludes (32a) and (32b) as admissible analyses of (29a). These analyses assume that John falsely remembers how the woman from his dream was presenting her clear skin in the actual world, @, (see (32a)) respectively in John’s dream world, w_1 .

- (32) a. $\dots [\lambda w_1 [\lambda w_2. (\text{the woman with tattoos})\text{-in-}w_1 \text{ presented her clear skin in } @]]$
 b. $\dots [\lambda w_1 [\lambda w_2. (\text{the woman with tattoos})\text{-in-}w_1 \text{ presented her clear skin in } w_1]]$

The roles of the different worlds are summarized in Table 1.1.

We have observed at the beginning of Section 1.3 that experiential attitudes are relations to personally experienced scenarios. To capture the informational partiality of such scenarios, we hereafter understand the term ‘world’ in a general sense that also includes spatio-temporal and informational world-parts.¹¹

¹¹ For a variant of the proposed account that explicitly uses situations [= informationally depleted spatio-temporal world-parts], the reader is referred to (Liefke & Werning, 2022).

- @ : the *actual* world; interpretive parameter for the matrix verb
- w_1 : the *host* experience world; interpretive parameter for the topic
- w_2 : the *parasite* attitude world; interpretive parameter for the comment

Table 1.1 Interpretive parameters for different constituents of attitude reports.

We have suggested above that the interpretation of the topic and the comment at different worlds clashes with the intuitive interpretation of episodic memory reports: in contrast to what is predicted by Blumberg’s account, the intuitive analysis of (7) (copied with a slight change in (33b)) interprets both the topic *the tree* and the comment *swaying in the wind* at John’s perceived visual scene [= the host situation].

- (33) *Context:* John took a stroll in the park and *saw* a tree swaying in the wind.
 a. (Now,) He remembers how the tree was swaying in the wind.
 ≡ b. John remembers how the tree *from his perceived visual scene (at the park)* was swaying in the wind in this scene.

Blumberg’s separation of the interpretive parameters for the matrix verb, the topic, and the comment is even less intuitive for primary experiential attitude reports (paradigmatically: visual perception). In these reports (see (34)), the topic and the comment are not only interpreted at the same parameter, viz. at John’s perceived visual scene: The parasite world is the host experience world. The identification of these parameters is supported by the intuitive redundancy of the phrase *from his perceived visual scene* in (34b):

- (34) a. John saw how a tree was swaying in the wind.
 ≡ b. ^(#) John saw how the tree *from his perceived visual scene (at the park)* was swaying in the wind in this scene.

To answer these difficulties, we propose to pairwise relate @, w_1 , and w_2 through a presupposition (or assertion). For primary experiential attitudes (paradigmatically: visual perception), ‘parameter-relating’ presuppositions include the existential import presupposition ExImp and the congruence presupposition Cong from Section 1.3. Translated into our formal framework, ExImp identifies the host experience world w_1 with the actual world, @ (i.e., $w_1 = @$). Cong identifies the parasite attitude world w_2 with the experience world w_1 (i.e., $w_2 = w_1$). The different identity requirements on interpretive parameters for reports of primary experiential attitudes are listed in Table 1.2. When providing the interpretation of these reports (e.g. (35)), we will follow the convention that presuppositions are underlined (as is done, e.g., in Schlenker, 2010).

ExImp and Cong enable us to give an intuitive interpretation of perception reports (in (35)).¹² In the specification of this interpretation, e' is a primary experience event

¹² To avoid an unnecessary complication of our interpretations, we hereafter ignore tense and aspect of the matrix verb. For a detailed discussion of the interpretive effect of progressive aspect, the reader is referred to (Özyıldız, 2021).

- ExImp (existential import presupposition): $w_1 = @$
- Cong (congruence presupposition): $w_2 = w_1$

Table 1.2 Identity requirements on interpretive parameters.

(here: a seeing event whose agent is John). The theme, or ‘object’, of this event (intuitively: what John is seeing in this event) is a scenario, w_2 , in which a particular tree is swaying in the wind. Since this scenario intuitively varies with e' (s.t. different perception events of the same tree swaying – at different times of day, under different weather conditions, and from different perspectives – will yield visual scenes with different content), we identify this scenario through a choice function, $\eta_{e'}$, that is dependent on e' . This function selects a world from the ‘classical’ proposition (in (35): the set of worlds, $\lambda w_2 : \underline{w_2 = w_1} . \exists x. tree_{w_1}(x) \wedge sway_{w_2}(x)$) that results from filling the first argument slot of a paired proposition that is denoted by the embedded sentence (for (33a): by *how a tree is swaying in the wind*) with w_1 . In (35), the selected world is John’s perceived visual scene (in which the tree is swaying in the wind).

$$\begin{aligned}
 (35) \quad \llbracket (34a) \rrbracket^@ &= \llbracket \text{John saw how a tree was swaying (in the wind)} \rrbracket^@ \\
 &= (\exists e') (\exists w_1 : \overbrace{w_1 = @}^{\text{ExImp}}) \left[\text{see}_@(e', john, \eta_{e'} \overbrace{w_2 : \underline{w_2 = w_1}}^{\text{Cong}} . \exists x. tree_{w_1}(x) \wedge \right. \\
 &\quad \left. sway_{w_2}(x)) \right]
 \end{aligned}$$

By identifying w_1 with the actual world, $@$ (achieved by ExImp), we give (34a) a relationalist/*de re*-interpretation. The identification of w_2 with w_1 (achieved by Cong) assumes the veridicality of the described ‘seeing’-event and, attendantlly, the factivity of the sentence, (34a), that is used to report this event. This factivity is supported by the intuitive validity of the inference from (34a) to the sentence ‘A tree was swaying in the wind’.

The anti-factivity of dream- and illusion-reports (see the inferences in (36) and (37)) can be captured by replacing the presupposed identities from (35) by presuppositions of differences:¹³

(36) a. Pete dreamt/hallucinated how eagles were flying over his head.

$\overset{\text{presup}}{\Rightarrow}$ b. No eagles were flying over Pete’s head.

(37) a. In the optical illusion, Fiona saw how the moon was enlarging on the horizon.

$\overset{\text{presup}}{\Rightarrow}$ b. The moon was *not* enlarging on the horizon.

The anti-factivity of (36a) is a consequence of assuming the negated counterpart, $w_1 \neq @$ (labelled A-ExImp), of existential import (see (38)). The anti-factivity of

¹³ Below, we use Uegaki’s (2021) notation for presupposition, $\overset{\text{presup}}{\Rightarrow}$.

(37a) results from assuming anti-congruence (A-Cong), i.e. $w_2 \neq w_1$ (see (39)). The negative counterparts of ExImp and Cong are given in Table 1.3:

- A-ExImp (anti-existential import presupposition): $w_1 \neq @$
- A-Cong (anti-congruence presupposition): $w_2 \neq w_1$

Table 1.3 Non-identity requirements on interpretive parameters.

$$\begin{aligned}
 (38) \quad \llbracket (36a) \rrbracket^@ &= \llbracket \text{Pete dreamt how eagles were flying over his head} \rrbracket^@ \\
 &= (\exists e') (\exists w_1 : \overbrace{w_1 \neq @}^{\text{A-ExImp}}) \left[\text{dream}_@ (e', \text{pete}, \eta_{e'}, w_2 : \overbrace{w_2 = w_1}^{\text{Cong}} \cdot \right. \\
 &\quad \left. \exists x. \text{eagle}_{w_1}(x) \wedge \text{fly}_{w_2}(x) \right] \\
 (39) \quad \llbracket (37a) \rrbracket^@ &= \llbracket \text{Fiona saw how the moon was enlarging (on the horizon)} \rrbracket^@ \\
 &= (\exists e') (\exists w_1 : \overbrace{w_1 = @}^{\text{ExImp}}) \left[\text{see}_@ (e', \text{fiona}, \eta_{e'}, w_2 : \overbrace{w_2 \neq w_1}^{\text{A-Cong}} \cdot \exists x. \right. \\
 &\quad \left. \text{moon}_{w_1}(x) \wedge \text{enlarge}_{w_2}(x) \right]
 \end{aligned}$$

Notably, in (39), the existential import of illusionary ‘see’ still allows for a valid inference to the existence of the moon that serves as the topic of Fiona’s illusion. This differs from the dream report, (38), whose presupposition $w_1 \neq @$ blocks an inference to the real-world existence of eagles.

Remark that we use the same non-logical constant, viz. *see*, in the analysis of (34a) (in (35)) and (37a) (in (39)). The existence of different presuppositions on *see* (esp. Cong vis-à-vis A-Cong) effects that ‘seeing’ is interpreted as veridical perception in (35), but as a [non-veridical] perceptual illusion in (39). In the second part of this section, we will make analogous use of the non-logical constant *mem* (which is used both in successful remembering as well as in misremembering and in confabulation).

The different presuppositions on primary experiential attitudes allow their classification along the lines described in Table 1.4. In the table, ‘+’ indicates the relevant presupposition (i.e. ExImp or Cong); ‘−’ indicates the corresponding anti-presupposition (i.e. A-ExImp resp. A-Cong).

Expectedly, like their primary relatives, secondary experiential attitudes, e.g. episodic remembering, allow an analysis in terms of existential import and congruence. However, to capture the experience-dependence of these attitudes, we need an additional requirement: experiential grounding, called ‘Ground’. This requirement demands that the attitudinal agent has (had) an experience whose object was w_1 . Ground differs from existential import and congruence in being asserted, rather than presupposed. The characterization of grounding as an assertion/entailment is supported by the observation that the inference to an experience¹⁴ is not preserved under

¹⁴ Stephenson (2010) calls this inference the ‘direct witnessing-requirement’.

Presupposition (\rightarrow) (\downarrow) Attitude	Example	Existential Impr $w_1 = @$	Congruence $w_2 = w_1$
veridical perception	(34a)	+	+
illusion	(37a)	+	–
hallucination / dreaming	(36a)	–	+

Table 1.4 Classification of (some) primary experiential attitudes

negation (see (40)–(41)). To avoid confusion about the validity of (41),¹⁵ we replace the non-manner *how*-clause by a gerundive small clause in (40) and (41).

- (40) a. John remembers a tree swaying in the wind. (see (7)/(33a))
 \Rightarrow b. John has experienced (viz. visually perceived) a tree swaying in the wind.
- (41) a. John *does not* remember a tree swaying in the wind.
 \Rightarrow b. John has experienced (viz. visually perceived) a tree swaying in the wind.

To capture the non-validity in (41), we call Ground an *entailment*. The Ground-related requirements on interpretive parameters are given in Table 1.5. In these requirements, ω is a function that maps the experience event, e , of a particular attitudinal agent to the world (or scenario, $\omega(e)$) that serves as the object of this experience. For John’s seeing event from (7)/(33), this object is the scenario (perceived from John’s particular visual perspective in the park) in which a tree is swaying in the wind.

Our interpretation of (33a) is given in (42). In this interpretation, ‘ $exp_{@}(e, john)$ ’ expresses that, in some specific spatio-temporal location of the actual world @, John has had an experience e . To allow for the distinction between different – and differently successful – kinds of remembering (along the lines of veridical perception, perceptual illusion, and hallucination; see above), we use the constant *mem* for a general mnemonic relation.¹⁶

- | |
|--|
| <ul style="list-style-type: none"> • Ground (grounding entailment): $\exists e. w_1 = \omega(e)$ • A-Ground (anti-grounding entailment): $\neg \exists e. w_1 = \omega(e)$ |
|--|

Table 1.5 Further requirements on interpretive parameters.

¹⁵ This is due to the fact that English non-manner *how*-clauses are ambiguous between a factive reading (which validates the inference) and a non-factive, eventive reading (which does not validate the inference; see Liefke, 2023).

¹⁶ Note that, to explicitly capture the generativity of episodic memory, one would need to replace the identity relation between w_1 and $\omega(e')$ by a weaker relation. This relation can be an informational inclusion, $<$ (see Liefke & Werning, 2022), an approximation, \approx , or an overlap, \emptyset . For an implementation of this idea with respect to Trace Minimalism, the reader is referred to Sect. 1.8.

$$\begin{aligned}
(42) \quad \llbracket (33a) \rrbracket^@ &= \llbracket \text{John remembers how a tree was swaying (in the wind)} \rrbracket^@ \\
&= (\exists e)(\exists e')(\exists w_1 : \overbrace{w_1 = @}^{\text{ExImp}}) \left[\left(\overbrace{\exp_@ (e, john) \wedge w_1 = \omega(e)}^{\text{Ground}} \right) \wedge \right. \\
&\quad \left. \underbrace{mem_@ (e', john, \eta_{e'} w_2 : w_2 = w_1 \cdot \exists x. tree_{w_1}(x) \wedge sway_{w_2}(x))}_{\text{Cong}} \right]
\end{aligned}$$

Notably, the satisfaction of the presupposition ExImp in (42) still yields a relational / *de re*-interpretation (see the equivalent, (43), of (42)):

$$(43) \quad (\exists x) \left[tree_@ (x) \wedge [\exists e \exists e'. (\exp_@ (e, john) \wedge @ = \omega(e)) \wedge mem_@ (e', john, \eta_{e'} w_2 : \underline{w_2 = @} \cdot sway_{w_2}(x))] \right]$$

It is for this reason that we have illustrated referential parasitism for secondary experiential attitudes in (29)/(30) on the example of misremembering, rather than remembering.

The above notwithstanding, the cancellation of ExImp is very much compatible with common intuitions about the felicity of imagination and memory reports. In particular, we need this cancellation to provide a plausible interpretation for memories from dreams (see, e.g., (44), interpreted against the context from (36a)).¹⁷ Below, we indicate the cancellation of a presupposition by striking through the label for this presupposition and by deleting the presupposed material.

$$\begin{aligned}
(44) \quad \llbracket (21) \rrbracket^@ &= \llbracket \text{Pete remembers how eagles were flying over his head} \rrbracket^@ \\
&= (\exists e)(\exists e')(\exists w_1 : \overbrace{w_1 = @}^{\cancel{\text{ExImp}}}) \left[\left(\overbrace{\exp_@ (e, pete) \wedge w_1 = \omega(e)}^{\text{Ground}} \right) \wedge \right. \\
&\quad \left. \underbrace{mem_@ (e', pete, \eta_{e'} w_2 : w_2 = w_1 \cdot \exists x. eagle_{w_1}(x) \wedge fly_{w_2}(x))}_{\text{Cong}} \right]
\end{aligned}$$

Analogous observations hold for the cancellation of the congruence presupposition Cong. This cancellation is required to allow for misremembering (i.e. instances of incorrect remembering, in which the mnemonic agent is not aware of the incorrectness of the remembered content). The cancellation of Cong is supported by the observation that, linguistically, misremembering can still be reported through the verb *remember* (see (45), interpreted against the context from (37a)):

$$\begin{aligned}
(45) \quad \llbracket (22) \rrbracket^@ &= \llbracket \text{Fiona remembered the moon enlarging} \rrbracket^@ \\
&= (\exists e)(\exists e')(\exists w_1 : \overbrace{w_1 = @}^{\text{ExImp}}) \left[\left(\overbrace{\exp_@ (e, fiona) \wedge w_1 = \omega(e)}^{\text{Ground}} \right) \wedge \right. \\
&\quad \left. \underbrace{mem_@ (e', fiona, \eta_{e'} w_2 : w_2 = w_1 \cdot \exists x. moon_{w_1}(x) \wedge enlarge_{w_2}(x))}_{\text{Cong}} \right]
\end{aligned}$$

¹⁷ An example of dream-based imagination (due to Blumberg, 2019) is given in (28).

Importantly, since cancelling a presupposition only involves waiving the requirement that is encoded in this presupposition (as opposed to endorsing its negation), cancelling Cong (or ExImp) has a different effect from assuming the satisfaction of A-Cong (or of A-ExImp). We will explore this difference below.

Our previous considerations suggest that different kinds of remembering can be captured through different presuppositions (resp. anti-presuppositions) and entailments (or anti-entailments). This is indeed the case, as is illustrated by the analysis of the misremembering report (4)/(46a) (in (47)). This analysis is supported by the particular entailment properties of this report, in (46b–d):

- (46) *Context*: On his visit to Berlin in 1990, Bill saw the quadriga on top of the Brandenburg Gate.
- a. (After so many years,) Bill misremembers the Nike on her chariot facing West.
 - $\overset{\text{presup}}{\Rightarrow}$ b. There is/was Nike on her chariot (whom Bill saw). (ExImp)
 - $\overset{\text{presup}}{\Rightarrow}$ c. The Nike on her chariot (whom Bill saw) was *not* facing West. (A-Cong)
 - \Rightarrow d. Bill has experienced (viz. seen) the Nike on her chariot. (Ground)

$$\begin{aligned}
 (47) \quad \llbracket (46a) \rrbracket^@ &= \llbracket \text{Bill misremembers the Nike facing West} \rrbracket^@ \\
 &= (\exists e)(\exists e')(\exists w_1 : \overbrace{w_1 = @}^{\text{ExImp}}) \left[\left(\overbrace{\exp_@ (e, \text{bill}) \wedge w_1 = \omega(e)}^{\text{Ground}} \right) \wedge \right. \\
 &\quad \left. \underbrace{\text{mem}_@ (e', \text{bill}, \eta_{e'} w_2 : w_2 \neq w_1 \cdot \exists x. \text{nike}_{w_1}(x) \wedge \text{face-west}_{w_2}(x))}_{\text{A-Cong}} \right]
 \end{aligned}$$

Like our account of correct remembering, our account of misremembering allows for misremembering to be based on veridical experiences (see (47)) as well as on non-veridical experiences. The latter is achieved by cancelling the existential import presupposition (see (48)). This cancellation helps capture the notorious case of misremembering dreams, which we have identified as the key challenge for representationalist and relationalist accounts of memory.

$$\begin{aligned}
 (48) \quad \llbracket (9) \rrbracket^@ &= \llbracket \text{Leyla misremembers that the plants were roses} \rrbracket^@ \\
 &= (\exists e)(\exists e')(\exists w_1 : \overbrace{w_1 = @}^{\text{ExImp}}) \left[\left(\overbrace{\exp_@ (e, \text{leyla}) \wedge w_1 = \omega(e)}^{\text{Ground}} \right) \wedge \right. \\
 &\quad \left. \underbrace{\text{mem}_@ (e', \text{leyla}, \eta_{e'} w_2 : w_2 \neq w_1 \cdot \exists x. \text{plant}_{w_1}(x) \wedge \text{rose}_{w_2}(x))}_{\text{A-Cong}} \right]
 \end{aligned}$$

In practice, the cancellation of ExImp is often triggered by an explicit predicate for a non-veridical experience (e.g., by the occurrence of the verb *dreamt* in (28)) or by a context (e.g., (9)) that identifies a non-veridical mode of experience (see Liefke, accepted).

The combination of different presuppositions and entailments also allows for an analysis of the confabulation report (5). The analysis in (50) is supported by the entailment properties in (49):

- (49) a. Bobby confabulates how (his imaginary friend) Tom played with him.
 $\xRightarrow{\text{presup}}$ b. Tom does *not* exist in the real world. (A-ExImp)
 $\xRightarrow{\text{presup}}$ c. Tom played with Bobby (in Bobby's confabulation). (Cong)
 \Rightarrow d. Bobby has *never*, in real life, experienced Tom do something (A-Ground)

$$\begin{aligned}
 (50) \quad & \llbracket (49a) \rrbracket^@ = \llbracket \text{Bobby confabulates how Tom played with him} \rrbracket^@ \\
 & \quad \text{A-Ground} \quad \text{A-ExImp} \quad \text{A-Ground} \\
 & = (\exists e') (\overbrace{\neg \exists e}) (\exists w_1 : \overbrace{w_1 \neq @}) \left[\left(\overbrace{\text{exp}_@ (e, bobby)} \wedge \overbrace{w_1 = \omega(e)} \right) \wedge \text{mem}_@ (e', \right. \\
 & \quad \left. \overbrace{bobby, \eta_{e'} w_2 : w_2 = w_1 . \text{play-with}_{w_2} (tom, bobby)}} \right] \\
 & \quad \text{Cong}
 \end{aligned}$$

The taxonomy of mnemonic relations that results from the above considerations is given in Table 1.6.

Presupposition (\rightarrow) (\downarrow) Attitude	Example	Existential Import $w_1 = @$	Congruence $w_2 = w_1$	Grounding $\exists e', w_1 = \omega(e')$
remembering	(7)/(33a)	+	+	+
misremembering	(46a)	+	−	+
confabulation	(49a)	−	+	−

Table 1.6 Classification of mnemonic attitudes

1.8 Trace Minimalism and Parasitic Reference

We have pointed out above that, to establish a parasitic reference relation in remembering, the primary experience must be uniquely identified. Only in this way can the evaluation of the mnemonic topic of the memory content be given. In the formal account of parasitic reference in episodic remembering, see (42), this is captured by the function ω , which yields the evaluation world w_1 of the mnemonic topic for a particular primary experience e , with $w_1 = \omega(e)$. The question now arises how the function ω , which links an episodic memory to its primary experience, is realized in a naturalist account of episodic memory. Here Trace Minimalism provides an adequate answer: Regardless of whether the primary experience is veridical or non-veridical, the minimal trace uniquely identifies it. This is achieved because the minimal trace

constitutes a causal link between the primary experience event – be it a perception or a dream/hallucination – at one end, and the event of remembering at the other end. The categorial and compositional content in remembering is generated through the interaction between the sparse fragment of neural information in the minimal trace and semantic information that has been acquired over the lifetime of the subject and contains abundant statistical regularities. The evaluation of the generated categorial content is, however, determined relative to the originally experienced scenario, given the primary reference relations of the original experience. See Figure 1.4 for illustration.

Our analysis of episodic memory provides a uniform, non-disjunctivist account of remembering and misremembering, independently of whether the foregoing experience was veridical or non-veridical. The analysis is thus in line with Cheng and Werning’s (2016) proposal to view episodic memory as a natural kind in the homeostatic-property-cluster sense, i.e. as “the maximal class whose members are likely to share [a large set of inductively and explanatorily relevant] properties because of some uniform causal mechanism” (p. 1358). That, under our analysis, episodic memory turns out a natural kind can be read off from the semantic analyses of cases of remembering from veridical experiences, e.g., (42), of cases of remembering from non-veridical experiences such as dreams/hallucinations, e.g., (44), or illusions, e.g., (45), as well as from the semantic analyses of cases of misremembering from veridical – e.g., (47) – and non-veridical – e.g., (48) – experiences. Amongst all of those cases, the postulated events and their underlying causal mechanisms are shared:

- (i) **A mnemonic event denoted by the predicate *mem*.** The mnemonic event is realized by a mechanism of scenario construction that generates a representation of the past event by synchronically combining the minimal trace with semantic information (shown on the right of Figure 1.4).
- (ii) **An experiential event denoted by the predicate *exp*.** The experiential event is mechanistically realized by a distributed pattern of activity in the visual, auditory, and other experiential regions of the neocortex (shown on the left of Figure 1.4).
- (iii) **A process described by the function ω .** The function identifies the evaluation world of the mnemonic topic with the evaluation world of the foregoing experience. It thus fixes the reference of the mnemonic topic in a way parasitic on the reference relation in the experience. Mechanistically, the function is realized by a minimal hippocampal trace, which diachronically connects the experiential to the mnemonic event. It does not carry over representational (i.e., compositional and categorial) content, but only sparse bits of neural information (shown in the middle of Figure 1.4).

Whereas condition (i) is also shared by the semantic analysis of the verb *confabulate*, as in (50), conditions (ii) and (iii) are the consequence of the experiential grounding entailment, Ground, and exclusive to *remember* and *misremember*. Importantly, the distributed patterns of activity postulated in condition (ii) are intrinsically indifferent as to whether the experience is veridical or non-veridical. From within our

analysis, there is therefore no reason to go disjunctivist with respect to the foregoing experience. Also, the minimal trace postulated in condition (iii) is not different in kind for cases of remembering and misremembering, nor for cases where the foregoing experience is veridical or non-veridical.¹⁸ The semantic analyses of the verbs *remember* and *misremember*, thus, do not differ with regard to the underlying causal mechanisms to which they ontologically commit us. Nor do they imply any mechanistic difference in kind regarding the veridicality of the foregoing experience. The semantic (and pragmatic) differences between *remember* and *misremember* and whether the verbs are applied to mnemonic events from veridical or non-veridical experiences are accounted for solely in terms of the entailed or presupposed identities and non-identities amongst the respective evaluation worlds and the actual world. However, those aren't facts about the underlying causal mechanisms, but matters of extrinsic (and contingent) relations.

Confabulation, however, differs from remembering and misremembering with regard to the underlying causal mechanism, given its semantic analysis in (50). This is due to the anti-grounding entailment, A-Ground. Even though in confabulation we also have a mnemonic or mnemonic-like event denoted by the predicate *mem* – which in regard to its occurrent (neocortical) neural pattern of activity (and consequently its phenomenological quality) may well be indifferent from cases of remembering and misremembering – the semantics of the verb *confabulate* does not entail a foregoing experience or, *a fortiori*, a causal connection to a foregoing experience. In fact, such a connection is explicitly negated in our semantic analysis.¹⁹ Whereas rememberings and misrememberings, be they from veridical or non-veridical experiences, belong to the same natural kind, i.e., the natural kind of episodic memory, confabulations do not.²⁰

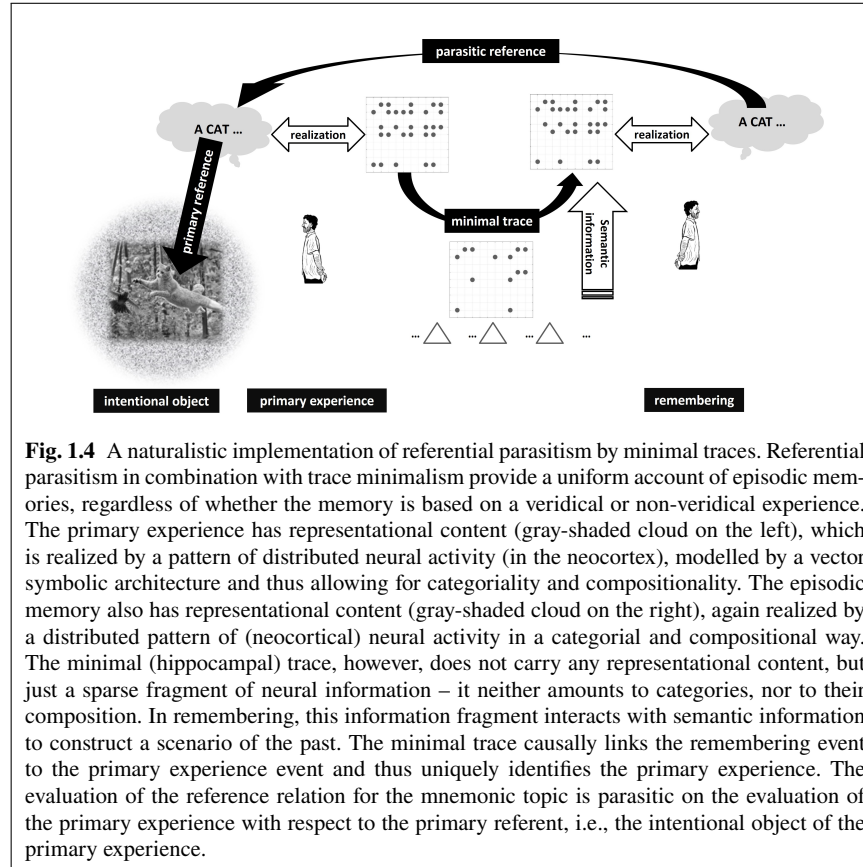
1.9 Conclusion

The two main historical strands in the philosophy of memory, representationalism and relationalism, disagree over (i) whether memory reports should be construed as *de re* or *de dicto*, (ii) to what type of entity agents are directed when they episodically remember, and (iii) how the time gap between the event of experience and the event of remembering is bridged. Representationalists hold that, in remembering, a person

¹⁸ For the interplay of dream and memory and, especially, the contribution of REM and slow-wave sleep to episodic memory and the formation of mnemonic sequences see Cheng and Werning (2013).

¹⁹ In this regard, our analysis of confabulation resonates well with Bernecker (2017) who concludes that “[...] what defines confabulations vis-à-vis genuine memories is not that they are false or lack epistemic justification but that they fail to be suitably causally connected to the corresponding past representations, either because there are no corresponding past representations or because the causal connection has been severed” (p. 12).

²⁰ In this respect, we share the disjunctivist consequence of Moran (2022) regarding confabulation. However, unlike Moran, we reject relationalism and group rememberings and misrememberings from veridical and non-veridical experiences into one and the same natural kind.



is directed towards a proposition. The relationship to the object of remembering is spelled out in terms of a *de dicto* construction. To bridge the time between the event of experience and the event of remembering, the proposition (or a content part thereof) is stored in a representational memory trace with categorial and compositional content. The representational memory trace, on the one hand, provides a causal link between the event of experience and the event of remembering and, on the other hand, (at least, partially) carries over representational content from the former to the latter. In so far, representationalist play the game of the Causal Theory of Memory.

Relationalists on episodic memory, in contrast, depart from a direct-realist position of perception. For them, in perception and likewise in remembering, persons are directed towards actually (at least, formerly) existing things in the world. Remembering is a proper relation between the person's remembering event and the thing remembered, and spelled out in terms of a *de re* construction. On one view (see footnote 5), this relation is realized by a causal link to the thing in the world, originally established in perception and upheld by means of a continuing causal connection that links the perception to the remembering. On another view (see footnote

6), the relation is one of constituency such that the remembered object is taken to be a constituent of the remembering event, making remembering an event that extends over a potentially very long period of time.

Relationalists and representationalists each face individual problems. Relationalism primarily fails – at least, as a comprehensive theory of episodic memory – because it is incapable of accounting for episodic memories from dreams and hallucinations. In those cases, there typically is no existing memory relatum in the actual world.

Representationalists, on the other hand, seem incapable of capturing the distinction between misremembering and confabulation. They, moreover, inherit the empirical and theoretical objections against the Causal Theory of Memory. Another challenge for representationalists is to explain the reference of the mnemonic topic in cases of episodic memories from dreams and hallucinations. For, in those cases they cannot recur to the the Causal Theory of Reference and might be forced to look for an escape in disjunctivism, which for independent reasons – especially concerning episodic memory as a natural kind – seems unattractive to us.

The predicaments of both, relationalists and representationalists, culminate when they are asked to address the phenomenon of misremembering dreams or hallucinations. In these cases, neither a *de dicto*, nor a *de re* analysis is possible. As we have shown, what is needed, instead, is a *de hospite* analysis. It links the evaluation of the mnemonic content to the evaluation of the content of the primary experience – regardless of whether the primary experience is veridical as in perception, or non-veridical as in dream or hallucination. As a consequence, the reference relations of the primary experience are passed on to secondary experience in remembering. Reference relations in episodic memory, hence, are parasitic on reference relations in the original experience. Trace minimalism naturally combines with the framework of referential parasitism and thereby provides a uniform, non-disjunctivist naturalistic account of reference in episodic memories from veridical and non-veridical experiences. We would like to emphasize that, in the light of referential parasitism, any transmission of representational content from the experience to remembering would be completely irrelevant to establishing reference relations in episodic memories. According to referential parasitism, what suffices is twofold: First, it must be presupposed that the primary experience – be it a perception, or be it a dream or hallucination – does have an intentional object to which it refers (in the wide sense). Theories of reference to intentional objects in veridical and non-veridical experience (perception, illusion, hallucination, dream) are available from the literature.²¹ The argument and account presented in this paper is neutral with regard to the choice of a specific theory of reference in primary experience. Second, the primary experience that underlies a particular episodic memory must be uniquely identifiable. This can be achieved by a minimal trace alone. It does not require a representational memory trace. The Causal Theory of Memory hence does not contribute anything to a uniform explanation of reference in episodic memory that Trace Minimalism cannot

²¹ As a theory of reference in primary experience, we favor an account in the spirit of Recanati's (2012) mental files in combination with neural models of compositional representation in cases of perception, illusion, and hallucination (e.g.: Maye & Werning, 2007; Werning & Maye, 2006)

itself provide. Trace minimalism in combination with a theory of parasitic reference, we may conclude, seems to be explanatory superior, because it is more parsimonious and empirically and theoretically more adequate than the Causal Theory of Memory.

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