Paper on constructive simulations & pictorial representation (title suppressed for peer review)

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Abstract

This paper explores the striking conceptual parallel between contemporary accounts of episodic memory (see e.g. Addis, De Brigard, Michaelian) and picture semantics (Greenberg, Abusch, Maier). It argues that picture semantics captures many familiar distinctions from philosophy of memory, while providing some additional – highly useful – tools and concepts (e.g. a mechanism for representation-to-content conversion and a general notion of situation that is independent of a given perspective). The paper uses these tools to (re-)structure and advance debate in contemporary philosophy of memory. Specifically, it (i) shows how these tools can be employed to defend the propositional nature of episodic memory contents, (ii) gives a sophisticated account of non-actual and non-particular episodic memory objects, and (iii) provides a new argument for pluralism about accuracy concepts and standards. Along the way, it defends a liberal version of the pictorial view of mnemic imagery, reveals faithfulness about accuracy as a (very) weak variant of radical authenticism, and explains different intuitions about the possibility of observer-perspective memories from dreams. The paper closes by suggesting, inversely, the import of these applications for picture semantics.

1 Introduction

The past decade has seen an explosion of philosophical work on episodic memory.[1] This work is inspired by relevant findings in psychology and cognitive neuroscience (see e.g. Addis et al., 2007; Hassabis and Maguire, 2007; Szpunar et al., 2007), which describe episodic remembering as a constructive simulation process that yields mental representations (or 'scenarios')[2] of a personally experienced past episode through the integration of episodic and semantic information (Addis, 2018; Cheng et al., 2016). This description has had a large influence on research in the epistemology (e.g. Michaelian, 2016b; Tooming and Miyazono, 2024), metaphysics (e.g. Barkasi and Sant'Anna, 2022; Fernández, 2017), and phenomenology of episodic memory (e.g. Perrin et al., 2020; Teroni, 2017; for an overview, see Sant'Anna et al., 2023).

[1] For simplicity, I will sometimes use the noun 'memory' or the adjective 'mnemic' as a shorthand for '(relating to) episodic memory'.

[2] Much literature in the psychology and philosophy of memory describes the result of constructive episodic simulation as a 'scene' (see e.g. Michaelian, 2016b; Roberts et al., 2018).

Simultaneously with this explosion of work in memory, linguists and philosophers of language have started to apply tools and techniques from formal semantics of natural language (e.g. compositionality, truth-conditional semantics, model-theoretic interpretation) to visual media like pictures, comics, and film (see esp. Greenberg, 2013, 2018; Abusch, 2020; Maier, 2024; Maier and Bimpikou, 2019).[3] This application assumes that, since visual representations are public, systematic, and conventional, they can be interpreted through a fixed set of rules – analogously to the semantics of spoken or written natural language (Greenberg, 2011, Ch. 1).

The resulting theory of meaning for pictures bears striking parallels to Addis et al.'s account of mnemic scenarios: Just like scenarios, pictures are informationally rich, perspectival representations of a three-dimensional space that can be about a particular object or episode ('referentiality'), that can correctly represent this object/episode ('accuracy'), and that can deviate in some (semantic or episodic) details from this episode ('constructivity'). Just like scenarios are representations of a past *episode* from the experiencer's (original or displaced, visual or other) *perspective*, pictures are geometrical projections of a *situation*[4] from the painter's (actual or imagined) *viewpoint*.

Surprisingly, the above-sketched parallels between mnemic scenarios and pictures have – to the best of my knowledge – never been utilized. This is especially surprising since picture semantics contains several tools, concepts, and distinctions (e.g. a mechanism for representation-to-content conversion, and a general notion of possible situation that is independent of a given viewpoint) that could be very profitably employed in contemporary discussions about episodic memory. The present paper remedies this situation: it applies these tools/concepts to the constructive view of episodic memory, in an effort to clarify the debate and help answer current issues in philosophy of memory.

The paper illustrates the merits of such application on three examples, viz. the debate about the propositional nature of episodic memory contents (see Fernández, 2017; Sant'Anna, 2018; Liefke, 2024a), the challenge from memories for non-veridical experiences (esp. from memories from dreams; see Michaelian, 2024b; Werning and Liefke, 2024), and the discussion about the 'right' concept of mnemic accuracy (see Bernecker, 2010; McCarroll, 2018; Michaelian and Sant'Anna, 2022). The first of these applications enables a strong defense of the propositional attitude view of episodic memory (*pace* Sant'Anna, 2018). The second application affords a new account of non-actual (e.g. dream-) and non-particular (i.e. 'generic') memory objects that gives these objects a definite ontological status with clear identity criteria (improving upon Michaelian, 2024b). The third application provides a principled justification of pluralism about accuracy concepts and standards (in line with Perrin and McCarroll, 2024).

I will show that these applications also have import beyond the above debates, and directly contribute to other ongoing work in the philosophy of memory. Thus, the general idea behind these applications supports a liberal version of the pictorial view of mnemic imagery. The first application provides a new argument for the compatibility of mnemic propositionalism with *de se*-content. The third application reveals faithfulness about accuracy (Michaelian, 2024b) as a (very) weak variant of radical authenticism

[3] A good overview of this work is provided in (Schlenker, 2018).

[4] Greenberg (2013) uses 'scene' instead of 'situation'. However, since 'scene' is reminiscent of Barwise's (1981) use of this term (which already includes a perspective) – and to avoid a confusion with the term 'scene' as employed in the psychology and philosophy of memory (see my fn. 2) –, I prefer the term 'situation'.

and explains different intuitions regarding the possibility of observer-perspective memories from dreams.

The paper is structured as follows: To provide the reader with the necessary background, I will first survey the key tools and concepts from picture semantics (in Sect. 2), transfer them to the constructive view of episodic memory, and identify some picture-semantic notions that do not have an intuitive correlate in the constructive view (in Sect. 3). I will then show how the application of these concepts can help[5] answer several current issues in philosophy of memory, including the above debates. Of the latter, the application to the debate about propositional memory contents is described in Section 4. The application to the challenge from memories from dreams, respectively to the discussion about the 'right' concept of mnemic accuracy are described in Sections 5 and 6. The paper closes by suggesting the import of these applications for picture semantics (in Sect. 7) and by identifying some further expected domains of application (in Sect. 8).

2 Picture semantics

Picture semantics (Greenberg, 2013, 2018, 2021; Abusch, 2020; Maier and Bimpikou, 2019; Maier, 2024) is an approach to the meaning – or representational content – of pictorial signs (e.g. photographs, drawings, maps) that models this content through the tools and techniques of formal semantics for natural language (see e.g. Montague, 1970, 1973; Portner and Partee, 2002). The latter is an approach to the meaning of words and complex expressions that identifies the meaning of an expression (paradigmatically, of a declarative sentence, e.g. (1); where meaning is marked by double square brackets, $[\![\cdot]\!]$) with the conditions under which this expression true (see Davidson, 2001; based on Tarski, 1936).[6] For the sentence in (1), such truth-conditions are given in (2). They are provided by specifying those circumstances of evaluation (or 'possible worlds') w in which (1) is true (abbreviated '**T**'). Specifically, for (1), these are those circumstances/ possible worlds in which a man is swimming (see (2a, b)).

(1) A man is swimming. (sentence, (1))

(2) $[\![\text{A man is swimming}]\!]$ (the meaning of (1))

= a. $\{w : [\![\text{A man is swimming}]\!]^w = \mathbf{T}\}$ (the truth-conditions of (1))

= b. $\{w : \text{some man swims in } w\}$ [fully spelt-out truth-cond's]

From truth-conditions like the ones in (2), a sentence's truth at the actual world, @, is obtained by considering whether @ included in the sentence's truth-conditions. Thus, (1) is true at @ if @ is a member of the set in (2b) (see (3)), and is false otherwise.

(3) $[\![\text{A man is swimming}]\!]^{@} = \mathbf{T}$ iff $@ \in \{w : \text{some man swims in } w\}$

[5] Caveat: I do not claim that this application will immediately solve the described issues in the philosophy of memory. Rather, I believe that it can help identify new parameters or previously overlooked distinctions that may eventually be used in (making progress towards) solving these issues.

[6] Besides identifying the truth-conditions of sentences, formal semantics also aims (i) to predict which sentences logically follow from a given sentence ('entailment') and (ii) to explain how the meaning/truth-conditions of a given sentence arises from the meaning/truth-conditional contribution of the sentence's syntactic parts (in (1): *a man*, *swim*) ('compositionality'). Since entailment and compositionality are not relevant for the present paper, I will not discuss them further. For an accessible introduction, the reader is referred to (Altshuler et al., 2019) and (Winter, 2016).

Historically, formal semantics has been exclusively concerned with spoken and written natural languages like English, French, and Japanese (see e.g. Montague, 1970, 1973; Lewis, 1972). Following Schlenker's (2011) pioneering work on formal semantics for sign languages (see also Davidson, 2014; Kuhn, 2016; Schlenker et al., 2024), recent research has proposed to extend the traditional program of formal semantics to other representational media like gestures (Ebert, 2024; Lascarides and Stone, 2006; Schlenker, 2019a), music (Schlenker, 2019b, 2022), film, and pictures (Greenberg, 2013, 2018; Abusch, 2020). This extension is justified by the assumption that, "for any representational form R, one [can] posit that 'to know the meaning of R is to know under what conditions it is true', [where] R [can] be a visual or an acoustic representation" (Schlenker, 2018, p. 366).

Schlenker's assumption about the general scope of semantics feeds the expectation that, analogously to formal semantics for spoken or signed language, "[t]he task for a semantics of pictures is to determine the rules [...] by which pictures, in context, may be associated with the contents they express" (Greenberg, 2021, p. 849). (I will show in Section 2.2 that, in contrast to their linguistic counterparts, the interpretive rules for pictures are, however, not restricted to truth-conditions, and centrally involve geometrical projection.) For reasons of space – and since the rest of this paper will focus on picture semantics –, I will not detail the relation between semantics for (natural) language and for pictures (instead, see Schlenker, 2018).

Below, I will first informally describe the picture-semantic understanding of pictorial signs and their various properties (in Sect. 2.1). I will then sketch Greenberg's geometrical projection-based account of pictures and pictorial content (in Sect. 2.2–2.3).

2.1 Pictures and their properties

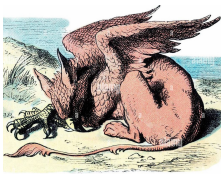
At a pre-theoretical level, picture semantics understands pictures as "public sign[s] whose representational properties are [...] distinctively visual" (Greenberg, 2021, p. 849). As a result, pictures exhibit specifically visual properties like perspectival organization and spatial cohesiveness (Greenberg, 2024) alongside more general representational properties like informational richness and partiality or underspecificity. These properties further include the ability to be about particular objects or events, with respect to which the pictures can be accurate (relative to a context).

The different properties of pictures are exemplified by the sample pictures in Figure 1.[7] Of these pictures, Pictures 1a and 1b show the informational richness of pictorial representations: These representations contain a whole array of information about the depicted object that goes much beyond mere categorizing information like 'is a gryphon' or 'is a can of Campbell's tomato soup'.[8] For Picture 1a, this array includes the information that the gryphon has a reddish brown body and wings, that it has massive yellow claws, and that it is lying asleep at a beach. For Picture 1b, it includes the information that the lid of the can is in mint condition, while the bottom has some small dents (esp. at the sides).

[7] Sources. Picture 1a: John Tenniel (1865), excerpt from *The Gryphon*; Picture 1b: Andy Warhol (1968), *Campbell's Soup I: Tomato*; Picture 1c: Matti Sanders (2023), *Mama*.

[8] I will discuss the question whether these contents are propositions (e.g. 'there is a gryphon') or non-propositional concepts (e.g. '[a] gryphon') in Section 2.2 and Section 4.

Figure 1: Examples of pictures



Picture 1a

Picture 1b

Picture 1c

Pictures 1a and 1b further illustrate the informational partiality (or underspecificity) of pictorial representations. Thus, Picture 1a does not contain any information about the color of the gryphon's belly fur or feathers (its belly is barely visible in the picture) or about whether the gryphon has a scar on its right lower back. In a similar vein, Picture 1b lacks information about whether the can of Campbell's soup has a barcode on the back (or at the bottom), and whether – at the time of depiction – it was located in its manufactoring plant, the grocery store, or a consumer's pantry. Some of this partiality is the product of the common perspectivity of pictures (apparent from the particular angle on the lid and the general impression of picture depth): if the can would have been depicted from a different perspective (e.g. from the back), we would have been able to obtain information about the presence of a barcode. In contrast, some partiality (e.g. the by-and-large absence of physical properties like (exact) shape or color in Picture 1c) is inherently linked to pictorial style (e.g. abstract vs. realistic painting).

Arguably, Picture 1b need not be a depiction of a *particular* can of Campell's tomato soup (e.g. the only can of soup in Andy Warhol's pantry on the evening of October 5, 1968) – that is, it need not be a 'portrait' (Goodman, 1969) of a can (or a picture of a can *token*). Rather, it may only be a [non-portrait] 'picture' that represents a certain *type* of can (here: of the original cans of Campbell's tomato soup; see Zimmermann, 2016). Ultimately, whether a given pictorial sign is a picture or a portrait can only be decided at the level of the painter's intentions: Even a perfect correspondence between the properties that are attributed to the picture's singular content and the visually perceivable properties of some real-world object (e.g. between Picture 1b and the first can of tomato soup that rolled off the assembly line in Campbell's new Camden plant on 26 August 1999) does not a portrait make. In fact, since the first can of Camden-produced soup did not exist in Warhol's lifetime, Picture 1b cannot be a portrait of this can (even though it can still be considered a portrait of this *type* of can).

Importantly, a match with visually perceivable properties of some real-world individual object is not even necessary for a picture to be a portrait. This is illustrated by Picture 1c, which is – by the painter's proclaimed intentions – a portrait of the author of this paper. However, I, the author, do not have (nor have ever had) a neck as long as my arm; neither have I ever worn a pair of heart-shaped glasses or held a gigantic lollypop. While Picture 1c is thus far from an accurate depiction of me (at any point in time), it is still a picture *of* me (i.e. it is my *portrait*). The difference between portraits and pictures is analogous to the difference between referential and non-referential cases of episodic simulation (e.g. between episodic memory and paradigmatic [= non-refer-

ential] cases of confabulation that involve made-up individuals or objects; see Liefke, 2023; Openshaw and Michaelian, 2024). I will further explore this analogy in Section 5.

This completes my preliminary pre-theoretical introduction to pictures. To show the explanatory power of picture semantics – and to prepare the application of tools and concepts from picture semantics to contemporary philosophy of memory (see Sect. 3 ff.) – the next two subsections introduce these tools and concepts. In line with the general goal of formal semantics, the rationale for introducing these tools is to provide a rigorous account of pictorial representation that improves upon its pre-existing competitors (esp. resemblance and actualist theories of depiction; see Greenberg, 2013, 2018).

2.2 Pictures as perspectival projections

At a more technical level, Greenberg's semantics understands pictures as geometrical projections (informally: visual depictions) of a situation from a viewpoint. Such situation can be a real-world situation (a small spatio-temporal part of the actual world; e.g. the site of Campbell's Camden plant on 26 August 1999) or a hypothetical/counterfactual situation (a spatio-temporal part of some other – possible or impossible – world; e.g. the beach from Lewis Carroll's fictional universe, at the time at which the Gryphon is sleeping there; see Stalnaker, 1968; Lewis, 1973; Kratzer, 2012). The former is the case in photographs and life drawings. The latter is the case in fictional and generic pictures. Whether the situation that underlies Picture 1b ['Campbell's Soup'] is a particular real-world situation or a generic or counterfactual situation depends on whether Picture 1b is interpreted as a portrait or a (non-portrait) picture.

I have already suggested in the previous subsection that *which* picture a situation gives rise to depends on the particular perspective of depiction (alongside other parameters like depiction style). To capture this dependence, Greenberg (2013) distinguishes the notion of situation from that of a viewpoint (see also Greenberg, 2018, 2021). He describes viewpoints as "a particular oriented location in space and time, in a particular possible world" or, more abstractly, as a "spatio-temporal index" (Greenberg, 2021, p. 852). As such, viewpoints need be neither visual nor do they need to capture the actual perspective of the painter or artist. In virtue of the latter, viewpoints can be unoccupied or even impossible.[9] I will show in Sections 4.3 and 6 how such viewpoints afford an account of perspectival displacement (D'Ambrosio and Stoljar, 2023; Liefke, 2024d; Liefke and D'Ambrosio, 2024) – e.g. in the case of observer memories (see McCarroll, 2018; Nigro and Neisser, 1983; Rice and Rubin, 2009, 2010). I will return to non-visual perspective in Section 3.1, when I move from pictures to mnemic scenarios. For the purposes of the present section, nothing speaks against understanding 'viewpoint' as the source of *visual* perspective-taking.

The notions 'situation' and 'viewpoint' are exemplified in Figure 2 (see Liefke, 2024d, p. 25; adapted from Greenberg, 2013, pp. 246–248). Figures 2a and 2c share the same situation (viz. a very small part of some world, that consists only of a particular Rubik's cube,  , located in a white space). They differ with respect to the viewpoint, v (represented by a red circle) from which this situation is perceived (or 'projected'). In Figure 2a, this viewpoint is straight in front of the white side of the cube. In Figure 2c, it is in front above of the top right corner of the white side of the cube.

[9] see Zimmermann's (2016, p. 440) example of a picture showing planet Earth melting in apocalyptic fire.

Figure 2: Different perspectives on a Rubik's cube, based on (Greenberg, 2013)

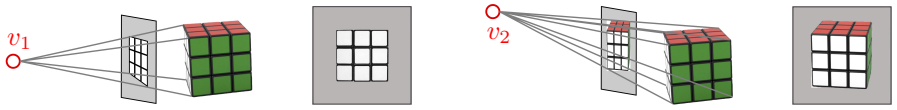


Figure 2a **Figure 2b** **Figure 2c** **Figure 2d**

Expectedly, the situation itself (incl. the cube, its location, and its properties) does not vary with the viewpoint from which it is perceived. However, this viewpoint has an effect on the situation's pictorial representation, or *picture* (see Fig. 2b vs. Fig. 2d). This representation is determined relative to the viewpoint and a projection function π, which collapses the situation onto a two-dimensional picture plane (marked by a grey area, , in Fig. 2). This function takes a situation s and a viewpoint v and returns a picture p (i.e. $\pi(s, v) = p$). For example, for the situation, , from Figure 2a/c and the viewpoint, v_1, from Figure 2a, it produces the picture in Figure 2b (see (4a)).

(4) a. $\pi($, $v_2) =$ b. $\pi($, $v_2) =$

The function π has contextually set parameters for, e.g., perspective type, edge-to-line-conversion type, and colors (see Greenberg, 2021; Maier and Bimpikou, 2019). For the present purposes, I assume that π is linear – meaning: it represents objects that are further away from the viewpoint by smaller regions on the picture plane (analogously to visual perception; see Greenberg, 2013, p. 239). Since they are not immediately relevant to the project of this paper, I here ignore other projection parameters.

Following Greenberg (2021) – and in line with Barwise (1981) –, I will sometimes call the 'combination' of a situation and a viewpoint (plus the picture plane) a *scene*. In picture semantics, scenes are sometimes alternatively called "viewpoint-centered worlds" (or 'viewpoint-centered situations'; see Greenberg, 2018; Rooth and Abusch, 2018), and are analyzed as ordered pairs of the form $\langle s, v\rangle$. They serve as the depiction's representational *target*, as I will show in the next subsection. A glossary with the picture-semantic terms that will be relevant in this paper is included in Table 1.

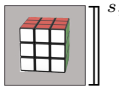
Table 1: Glossary of picture semantic terms (see Greenberg, 2021)

situation:	a spatio-temporal (3D) part of a(n actual or counterfactual) world, s
viewpoint:	a spatial location, v [= the projection source], relative to which s is represented
scene:	a viewpoint-centered situation, $\langle s, v\rangle$; the *target* of the representation of s from v
projection:	a (geometrical) picture-to-scene transformation, π
picture:	a 2D-representation [= projection] of a situation from a viewpoint, $\pi(s, v)$

2.3 Pictorial contents as (strict) accuracy-conditions

The described projection relation between pictures and scenes (see (4)) gives rise to an intuitive definition of pictorial accuracy. According to this definition, a picture accurately represents its target scene $\langle s, v\rangle$ – or is *accurate of* this scene – if, from v, s 'looks like' the picture (Maier and Bimpikou, 2019) (see Greenberg, 2018, 2021 for a sophis-

ticated version of this definition). For ease of exposition, I will intermittently treat accuracy as a binary notion, where '**T**' means 'perfectly accurate' and '**F**' means 'not at all accurate' (see (5)).[10] I assume (somewhat simplifyingly) that photographs and life drawings accurately represent their target, while fictional pictures do not – although, in the latter case, accuracy depends on how one defines 'target'[11] (see Sect. 5 and the discussion in Greenberg, 2018, pp. 883–894). Following the notational standard in picture semantics, I abbreviate 'p is an accurate representation of the target scene $\langle s, v\rangle$' (or 'p is accurate of $\langle s, v\rangle$') as $[\![p]\!]^{s,v} = \mathbf{T}$ (see (5a)).

(5) a. $[\![$  $]\!]^{s,v_2} = \mathbf{T}$ iff b. $\pi(s, v_2) =$ 

The accuracy-conditions for the picture from Figure 2d are given in (6a). These conditions are specified by the set of situations s (or worlds w) in which there is some viewpoint v for which $[\![p]\!]^{s,v} = \mathbf{T}$.

(6) a. $\left\{ s : \exists v.\ [\![$  $]\!]^{s,v} = \mathbf{T} \right\}$ = b. 'There are 3×3 white squares with black joints that form one side of a cube. One adjacent side is red …'

It is generally assumed that content determines accuracy-conditions (for recent expressions of this view, see e.g. Grzankowski, 2014, Vicente, 2021). Thus, Greenberg (2021) states, "The content of a picture corresponds to what's happening in it, or the situation it represents, which in turn determines the set of conditions under which the picture is accurate" (p. 849). Since picture semantics describes these conditions in terms of sets of (worlds or) situations[12] – and since situations are the familiar evaluative circumstances for propositions (see e.g. Kaplan, 1989; Kratzer, 1989; Moltmann, 2020; and my elaborations from the introduction to Sect. 2) –, there is good reason to take the content of pictures to be propositions (Greenberg, 2018; Grzankowski, 2015; Liefke, 2024d). The propositional content of the picture from (4b)/Figure 2d is given in (6b). This content is a complex conjunctive proposition that results from combining all (simpler) propositions that are true of the picture (see Liefke, 2024a). The latter include the proposition 'There are 3×3 white squares' and 'One of the white squares' adjacent sides is red'.

The observation that pictures have propositional content is captured by the view of pictorial propositionalism, paraphrased below (see Liefke, 2024b, p. 10):

Pictorial propositionalism. All pictorial content is propositional/truth-evaluable.

The assumption that picture contents are propositional has a number of important merits (to be further explored in Sect. 4.1). Thus, in virtue of their propositional nature,

[10] I will criticize and modify this view of pictorial accuracy in Section 7.

[11] In particular, if the target is the underlying real-world situation (of which the artist is mentally constructing a counterfactual alternative; see e.g. De Brigard and Parikh, 2019), the picture is not accurate of this target. However, if the target is the artist's intended (mental) counterfactual situation, the picture will possibly be accurate of its target.

[12] In what follows, I will identify pictorial contents with sets of situations (following Abusch, 2020; Maier, 2024; Maier and Bimpikou, 2019). However, this identification is for simplicity only. It should not be taken to suggest that picture contents have the same (comparative) coarse-grainedness as sets.

these contents (i) can be expressed through declarative sentences (for : the sentence in (6b)), (ii) can be true or false of their underlying situation, (iii) give rise to logical inferences, and (iv) can be entertained by different agents and serve as the content of different mental states. In virtue of (ii), the content of is true of the situation and false of the situation (but see my discussion in Sect. 4.2). In virtue of (iii), this content entails that there are white squares.

My previous presentation suggests that the results of depicting the same situation from different viewpoints will (at least in part) have different propositional contents. This is indeed the case: Since the picture in (4a)/Figure 2b does not show any but the white side of the Rubik's cube, its content will not include the proposition in (7b) – in contrast to (4b)/Figure 2d (though it will include the proposition in (7a)). Since the set of situations in which (6b) is true is a subset of the set of situations in which (7a) is true, the propositional content of (7a) is included in the content of (6b) (i.e. (6b) is informationally richer than (7a)).

(7) a. There are 3×3 white squares with black joints that form a larger square.
b. The larger square is one side of a cube. The adjacent sides are red ...

The difference between the content of different perspectival projections of the same situation is even more apparent for the situation and viewpoints in Figure 3a and 3c:

Figure 3: Different perspectives on a man swimming, based on (Liefke, 2024d)

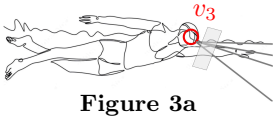


Figure 3a

Figure 3b

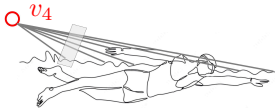


Figure 3c

Figure 3d

As in the case for the contents of Figure 2b and 2d, Figures 3b and 3d[13] share some of the same content (expressed by the grey material in (8)). However, in contrast to the content of Figures 2b and 2d, none of their contents is fully included in the content of the other (see Liefke, 2024d). Thus, while the picture in (8a)/Figure 3b contains the additional content that the swimmer's hand is – or appears – smaller than his arm[14] (see the black material in (8a)), the picture in (8b)/Figure 3d contains the additional content that the swimmer (whose head and torso are not shown in Figure 3b) has short brown hair and a tanned back. The different propositional contents of the pictures from Figures 3b and 3d are given in (8):

(8) a. $\left\{ s : \exists v. \left[\!\!\left[\right.\right.$  $\left.\left.\right]\!\!\right]^{s,v} = \mathbf{T} \right\}$ = 'A man is swimming in a body of bubbly blue water. His left arm is stretched out; his left hand is smaller than his arm ...'

b. $\left\{ s : \exists v. \left[\!\!\left[\right.\right.$  $\left.\left.\right]\!\!\right]^{s,v} = \mathbf{T} \right\}$ = 'A young man swims in a body of blue water. His left arm is stretched out; he has short brown hair and a tanned back ...'

[13]Image source: Cristian Palmer. 20 Sept. 2022. https://unsplash.com/photos/RaOKzBtN8fI.
[14]This description involves overtly perspectival content.

3 Mnemic scenarios as pictures

I will show below how the notions of picture and pictorial content from the previous section can be applied to the (mnemic) scenarios that result from constructive episodic simulation. However, before I can do so, I first need to generalize the picture-semantic notion of perspectival projection to other, i.e. non-visual, modes of experience:

3.1 Generalizing modes of projection

I have already pointed out (at the beginning of Sect. 2.2) that, in picture semantics, perspectival projection is by default understood as geometrical projection that employs a visual projection mode (e.g. edge-to-line conversion; for an explicit statement of this default, see Maier, 2024; Schlenker, 2018). While the visual nature of pictures validates this narrow conception of projection, it blocks a generalization to other domains. This already holds for poorly executed visual art (which violates some geometrical projection principles; see Greenberg, 2021, p. 853) as well as for music, culinary, and performative art: Instead of capturing what the situation *looks* like (from the perspective of the projection source), these forms capture what the situation *sounds* like, *tastes* like, or *feels* like (for that source). By generalizing the mode of projection from the visual to the auditory, gustatory/olfactory, proprioceptive, and emotional modality, Greenberg's theory could straightforwardly account for such non-visual projection (cf. Schlenker, 2018).

Replacing a visual mode with a proprioceptive mode of projection (i.e. what the situation *(physically) feels* like [for the source]) also provides a more intuitive account of the first-person perspectival swimming picture from Figure 3b ['swimmer own-eyes'] (see (8a)). In many cases, the content of an experiencer-perspective swimming event is not purely visual. Rather, it involves sensory detail like (9a–c) (due to Vendler, 1979).[15]

(9) a. The water tastes salty ...

b. The water feels cold ...

c. The current is pulling on the swimmer's legs. Adrenaline is rushing through his body. His arms are engaged in a crawl ... $= \left\{ s : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v} = \mathbf{T} \right\}$

Specifically, if π is a proprioceptive projection function (see (10a), where the red circles on the swimmer's upper arm indicate a proprioceptive projection source), the content in (9c) can be obtained by applying π to the situation from Figures 3a/c and the projection source v_5 (see (10b)):

(10) a. 

b. $\pi($  $, v_5) =$ 

By bundling multiple projection functions (with different modes of projection) – or by identifying π with a multi-modal projection function (that comprises different such modes) –, we can obtain a representation with the combined content of (8a) and (9).

[15] In the right side of the equation in (9c) (see also (10b)), the muscle anatomy image of a swimmer is only a metaphor for the result of performing a proprioceptive projection on the situation and projection source(s) in (10a). That this result is not a visual representation (i.e. a 'picture') is supported by the arguably non-visual content from the left side of the equation.

Arguably (contra what is suggested by Greenberg, 2013, 2018), the projection source is not always fully determined in the sense that it can, in some cases, not be identified with a precise spatio-temporal location from which the situation is represented. Rather, this source may be distributed across different spatio-temporal locations (s.t. it consists of multiple projection sources) or may be identified with a certain *region* of space-time. The former is the case in superimposed pictures like the one from Figure 4a. The latter is the case in unfocused pictures like the one from Figure 4b. 'General-region' projection sources are also common in proprioceptive and multi-modal projection. Thus, in (10a), the projection source are the swimmer's biceps and triceps, rather than a single punctual location in these muscles.

Figure 4: Superimposed (a) and unfocused picture (b) of a man swimming

Figure 4a

Figure 4b

Combining multiple punctual projection sources – or identifying the projection source with a region of space-time – accommodates pictures that are obtained from such distributed or general sources.

The contrast between (8a) and (9)/(10) suggests that perspective cannot (or should not) be identified solely with the projection source [= Greenberg's 'viewpoint']. Rather, it should be identified with a combination of the projection source (in Fig. 3a: the swimmer/his eyes; in Fig. 3c: a spatio-temporal index located five inches above/behind the swimmer's back) and projection mode (in Fig. 3a/c: visual). The difference between the representations in Figures 3b and 3d – given the same projected situation and (roughly) the same projection source, i.e. the swimmer – then suggests the possibility of only minimally overlapping projection contents. To avoid suggesting an association of perspective with the visual modality, I will hereafter refer to Greenberg's viewpoints as 'perspectives' in the above, combined, sense.

3.2 Picture-to-scenario transfer

The attentive reader may have noticed that the representations and contents in Figure 3d/(8b) ['swimmer from above'] and in Figure 3b+(10b)/(8a)+(9) ['swimmer own-eyes'] are strongly reminiscent of the representations or contents of the swimming scene from (Vendler, 1979) (see (11)). Interestingly, however, Vendler characterizes (11a) and (11b) as the contents of episodic imagining/remembering, rather than as the contents of pictures.

(11) a. A swimmer's body is being tossed about, bobbing up and down in the foamy waste ...

b. The water feels cold and tastes salty, the current is tugging on his legs ...

The fact that (11a)/(11b) simultaneously serve as experiential and pictorial contents already suggests a strong parallel between mnemic (or more broadly: episodic) scenarios and pictures: like pictures, mnemic scenarios are perspectival representations of a (past) situation or episode. Whereas the representational target of a picture is a scene (or a viewpoint-centered situation), the representational target of a mnemic scenario is the perspectival object of a past experience (what I will call a 'subjective episode'). Just like the perspectivity of pictures originates from a (typically visual) viewpoint, the perspectivity of mnemic scenarios originates from some experiential (possibly non-visual, and often multi-modal) source (see McCarroll, 2018). Interestingly, the different experiential modes or projection functions that give rise to a multi-perspectival representation can originate from different perspectival/projection sources.[16] This holds for visual-only representations (which can result from merging different-viewpoint depictions of the same situation, e.g. Fig. 3b and Fig. 3d) as well as for multi-modal representations (which assume *different* projection sources for different modes of experience; contra what was assumed in the last paragraph of Sect. 3.1).

The larger parallelism between picture semantics and contemporary accounts of episodic memory is graphically captured in Figure 5. This figure assumes Addis' (2018) view of episodic memory (see Cheng et al., 2016; Michaelian, 2016b), on which remembering is a constructive simulation process that yields mental representations of a personally experienced past episode (see the beginning of Sect. 1). Importantly, while contemporary accounts of episodic memory (incl. Addis' account) distinguish the past episode from the agent's experience of it, they often do not draw a distinction between the episode itself (in Fig. 5: the 'objective episode') and the perspectival object of the agent's past experience (the 'subjective episode'), contrary to what is done in picture semantics. Since the subjective episode can have a very different content from the objective episode and from the agent's experience of this episode, this is a valuable distinction (as I will show in Sect. 4.2 and 6). For example, this content includes metarepresentational properties like 'happened in the past' or 'happened to me', which are only part of subjective – but not of objective – episode content (see Sect. 7). For two recent accounts of episodic remembering that incorporate (some version of) the distinction between the objective and the subjective episode, the reader is referred to (Fernández, 2024a; 2024b) and (Michaelian, 2024b).[17]

For easy comparability – and at the risk of doubling information –, I include a memory-specific 'translation' of the picture semantic glossary from Table 1 in Table 3.

In virtue of the above parallelism, mnemic scenarios share nearly[18] all of the properties of pictures from Section 2.1. As I have mentioned above, this holds for their being perspectival representations of events or these events' objects and for their containing rich, high-level[19] information about these events/objects. Interestingly, in contrast to pictures, mnemic scenarios typically do not require interpretation: their construction

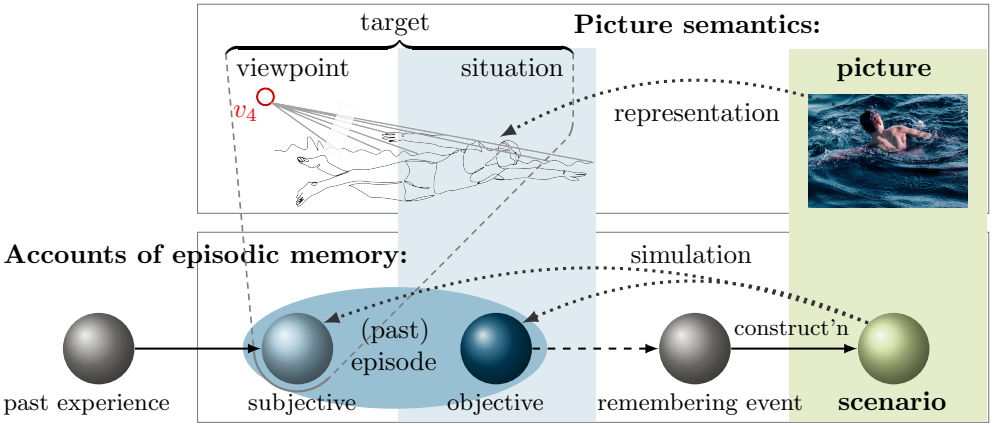
[16] I thank John Sutton for raising my awareness of this point.

[17] Michaelian (2024b) calls the subjective episode the 'intentional object'. Fernández (2024a) calls subjective episode content 'phenomenal'.

[18] Exceptions to this parallelism include the fact that scenarios – unlike pictures – are not always distinctively visual, that most accounts of episodic memory do not assume an explicit analogue of Greenberg's 'target', and that picture semantics neglects the representational attitude of depiction itself (alongside metarepresentational properties involved in depiction). I will return to the last point in Section 7.

[19] High-level [= conceptual/semantic] information differs from low-level [= rich perceptual] information [with fully sensory detail] in having a (much) higher level of abstractness (see e.g. Heinen et al., 2024).

Figure 5: Parallelism between scenarios and pictures



already includes a conceptualization of all remembered objects. Thus, while I may be unsure whether the blurry picture in Figure 4b depicts a human or a seal swimming, my otherwise identical mnemic mental image will typically contain such information (s.t., in my mnemic scenario, the swimming individual will already be conceptualized as a man [or, respectively, as a seal]; see Rowlands, 2009, 2018).[20] I will return to conceptualizations and the need for (or dispensability of) interpretation in Section 5.

Table 2: Glossary of picture semantic terms (in italics) and their mnemic analogues

situation:	a spatio-temporal (3D) part of a(n actual or counterfactual) world, s
obj. episode:	a spatio-temporal part of a(n actual or counterfactual) world
viewpoint:	a spatial location [= the projection source], v, relative to which s is represented
perspective:	the spatial location + experiential mode relative to which an episode is represented
scene:	a viewpoint-centered situation, $\langle s, v\rangle$; the *target* of the representation of s from v
subj. episode:	an episode perceived from a perspective; the perspectival object of a past experience
projection:	a (geometrical) picture-to-scene transformation, π
simulation:	the mnemic representation of a past subjective episode
picture:	a (visual) 2D-representation [= projection] of a situation from a viewpoint, $\pi(s, v)$
scenario:	a mental representation of a past episode from a particular mnemic perspective

With this – as I will show minor – difference between memories and pictures out of the way, I return to their striking similarities: Next to phenomenological properties like experience-likeness and perspectivity, scenarios and pictures also share a number of broadly 'semantic' properties. These are properties like aboutness, reference, truth, and accuracy that concern (i) the information that is carried by the picture or scenario, (ii) the (eventive or objectual) target of this information, and (iii) its correspondence to – or fit with – this target. In particular, scenarios share the informational partiality of pictures, including the different sources of this partiality. Thus, partiality can either result from the scenario's perspectivity, from selective encoding and/or lossy retrieval,

[20] I owe this point to Christopher McCarroll.

or, in certain cases; e.g. in memories from dreams) from the non-particularity of the originally experienced object.

Importantly, even in the case of memories from dreams (see Michaelian, 2024b; Werning and Liefke, 2024), the objects of the mnemic scenario are specific in the sense that they 'are' (or represent) the objects from the original experience (even if these objects are not particulars). To see this, assume (with Liefke and Werning, 2023) that I have been dreaming of some hippo or other – no particular one whom I have come across in real life. Given that this object originates from my dream, it is likely not a real-world inhabitant. Even if a psychic (truthfully) told me that this hippo existed in the actual world, I would not command the necessary criteria for such identification: Even if exactly one real-world hippo had all the properties of the hippo from my dream, I could not be sure that this was my dream-hippo (after all, numerical identity cannot be established from co-exemplification of properties; see e.g. Loux and Crisp, 2017).

The resulting un(der-)determination of some mnemic objects notwithstanding, they still afford reference and aboutness: In particular, my reported hippo memory is still *about* the hippo from my dream. This is similar to the gryphon-case from Section 2.1: Tenniel's painting is about *the* Gryphon from 'Alice's Adventures in Wonderland' although this gryphon is neither actual nor fully determined. In both cases, reference can be explained by the existence of a counterfactual situation (viz. Carroll's fictional universe, my dream-episode, both with their individual inhabitants) of which the relevant representation is a perspectival projection. I will return to this point in Section 5.

Regarding their specificity and aboutness, the objects of dream memories distinguish themselves from objects that are included in a (pictorial or mnemic) representation through the process of constructive simulation (e.g. the gigantic lollypop in the portrait/Picture 1c). In particular, unless these objects are 'imported' from other episodes (at which their reference is fixed; see Liefke, 2024c; Aronowitz, 2024), they lack a referent. Instead, such objects might be treated as (multiply exemplified) properties (e.g. 'hold-some-lollypop'; analogous to Quine's (1948) property 'pegasizes'). For episodic memory, this is the case in the common supplementation of episode or trace information with semantic information and general world knowledge (see e.g. Addis, 2018; Cheng et al., 2016). Examples of such supplementation include the information that the swimmer in Figure 3d is wearing swimming trunks (motivated by our cultural habit of wearing swimwear for swimming).

Intuitively, whether the supplemented information happens to be true of the target influences whether the representation is accurate relative to this target. Picture semantics captures this intuition by assuming that "a picture is accurate when the content it expresses fits the target scene it aims at" (Greenberg, 2018, p. 865). The latter is the case if the picture content is included in the maximal propositional content that is true at the target. In the same vein, authenticist views of episodic memory (cf. Bernecker, 2010; McCarroll, 2018) hold that a mnemic scenario is accurate when its content is (largely)[21] true of the subject's original experience (i.e. if [the scenario] "includes [little or] no content that was not included in the subject's original representation of the

[21] The precise extent of admissible new content is a point of current debate in philosophy of memory, and opens up a slippery slope towards confabulated 'memories' with all-new-content (see Michaelian, 2016b; McCarroll et al., 2024). I will sketch an attempt to block this slippery slope in Sect. 6.

event"; Michaelian, 2024b, p. 6). I will return to this and other concepts of mnemic accuracy in Section 6.

The many commonalities of scenarios and pictures are summarized in Table 3. To enable a maximally fruitful comparison, this table uses the same example (viz. Picture 1c ['Mama'] and scenario/Fig. 3d ['swimmer from above']) for all dimensions of comparison. These include the presence and specific exemplification of different phenomenological and semantic properties as well as the extent of episodic construction.

Table 3: Commonalities of scenarios and pictures

	Property	evidence in **Picture** 1c 	ev. in **Scenario**/Fig. 3d 	**Class**
1.i	(multi-)Modality:	visual perception	visual (+ emotional)	phenomenological properties
1.ii	(multi-)Perspectivity:	back of head not visible	face/legs not visible	
1.iii	informational Richness:	shape of head/face/...	shape of right shoulder	
2.i	Partiality/Underspecif'ty:	no skin color [biro pic.]	Are his ears sunburnt?	semantic properties
2.ii	Specificity/Referentiality:	1c is of/about K.L.	about a particular 'he'	
2.iii	Indexicality:	if K.L. had drawn 1c	in observer memory	
2.iv	Accuracy:	evaluated w.r.t. K.L.	evaluated w.r.t. episode	
3.	Constructivity:	changed glasses, + lolly	e.g. water less blue, ...	other

The list of semantic properties from Table 3 contains one previously neglected dimension, i.e. indexicality (2.iii). I have already explained in Section 2.1 that pictures can be pictures *of* a particular individual or object, i.e. they can be *portraits*. Arguably, the target of a portrait can be either some other individual (as is the case in Picture 1c) or the painter himself (making the picture a *self-portrait*). An analogous observation holds for episodic memory: A mnemic scenario can be a representation of an episode that features some other individual(s)[22] or the rememberer himself. Scenarios of the last kind are involved in observer-perspective autobiographical remembering (Addis et al., 2011).

3.3 Defending the pictorial view of mnemic imagery

I have argued above that mnemic scenarios – including the mental images involved in these scenarios – resemble pictures in a surprising number of ways. At first glance, my argument seems to support the much-criticized pictorial (or depictive) view of mental imagery (see Kosslyn, 1986; Kosslyn et al., 2006; Tye, 1988, 1991). According to a strict version of this view (dubbed the 'photographic' view in Block, 1983; McCarroll, 2024; Rowlands, 2018),[23] mental images are exclusively visual, presuppose an actual target event or state (which they represent), reflect the agent's original perspective on this

[22]This holds although, in this kind of scenario, the rememberer can provide the perspective/viewpoint on this episode.

[23]To emphasize the realist and total nature of this view, Wiltsher (2019) calls a close variant of this view the 'mirror theory'.

target, depict all elements of the target that are visible from this perspective, are perfectly accurate of this target, and have an equally high level of detail as the target (s.t., in particular, they fully determine all objects in and properties of the target).

A quick glance at the images in Figure 4 and example (10b) shows that the above is not always the case (see e.g. Bigelow et al., 2023; McCarroll, 2024; Wiltsher, 2019; cf. Greenberg, 2013): In contrast to realistic photographs, mnemic images often involve other sensory modalities (see (9)), may (be intended to) represent counterfactual targets (e.g. dreamt episodes), may display a shifted viewpoint (see (11a)/Fig. 3d ['swimmer from above']) alongside effects from other constructive phenomena (thus bringing about at least partial inaccuracy; cf. Tye, 1988), may only focus on *parts* of the target, may be lossy (and hence contain less detail than the target), and may be indeterminate relative to the target.[24] Since photographs are restricted to *perceptual* aspects of the target, they further cannot capture indexicality in self-locating mental images (e.g. the scenarios that serve as the objects of autobiographical memories).

Defenders of the pictorial view have tried to answer these objections by relaxing the demands on imagistic depiction. This relaxation is apparent in Block's (1983) conjecture that "[p]erhaps mental images are more like pictures that one *draws*, rather than like photographs" (p. 658). This conjecture is in line with the observed partiality, unspecificity, and inaccuracy of the pictures from Figure 1 [i.e. 'The Gryphon', 'Campbell's Soup I', and 'Mama'] (see my elaborations in Sect. 2.1). Specifically, by assuming that pictures can alter some (or more) details of the depicted target – and can even change the target's overall valence – such relaxation explains the lower level of detail, the constructive nature, and the perspectival distortion of mental images (see also Wiltsher's (2019) 'lens theory').[25] By assuming that pictures are not restricted to actual targets, the non-photographic pictorial view generalizes to counterfactual mental images (cf. Greenberg, 2018). The lower level of detail in mental images is also explained by reference to inattention or other cognitive limitations (see Kosslyn et al., 2006; cf. Bigelow et al., 2023).

The above attempts notwithstanding, the non-photographic pictorial view still fails to explain the multi-modal and the indexical nature of mnemic imagery (for the latter, see Rowlands, 2018, pp. 284–285). By generalizing depictive modes to non-visual modes of experience (along the lines described in Sect. 3.1) – and by assuming that mnemic scenarios can have self-locating, or *de se*, content (see Sect. 4.4) –, this paper defends a liberal version of the pictorial view of mnemic imagery that answers these challenges.

The comparison from the previous subsections induces the impression of a (near-) perfect parallelism between picture semantics and contemporary accounts of episodic memory. Importantly however, there are some non-topic-related differences between picture semantics and contemporary accounts of episodic memory. These differences concern additional tools and concepts that are explicitly available in picture semantics, but that are either implicit or missing in accounts of memory. In this sense, picture semantics has a partly richer toolbox than contemporary accounts of episodic memory.

[24] Thus, Dennett (1969, p. 136) reasons that "a picture of a speckled hen must have a determinate number of speckles; a mental image of a speckled hen does not; so a mental image of a speckled hen is not pictorial" (summary due to Block, 1983, p. 653; Dennett's original example uses a tiger and the number of its stripes).

[25] In fact, given sufficient creative liberties, pictures need not depict any target whatsoever. This observation can be used to account for imaginative scenarios that do not (aim to) represent a past experience.

Valuable extra items in this 'toolbox' include a mechanism for representation-to-content conversion (see Sect. 2.3) and generalized notions of situation and target that also include non-actual situations/targets (see Sect. 2.2). I will show below that these items allow a straightforward extension of contemporary accounts of episodic memory to memories from non-veridical experiences (viz. by utilizing possibilistic situations; see Sect. 5), that they help identify modular accuracy classes (by using the situation/target-distinction; see Sect. 6), and that they provide the means to defend mnemic propositionalism against some recent objections from Sant'Anna (2018) (by employing picture semantics' representation-to-content conversion mechanism, see Sect. 4).

4 Application 1: mnemic propositionalism

Much recent work in philosophy of language and mind has assumed propositionalism about attitudes/mental states. In its simplest form, this view (dubbed 'attitudinal propositionalism' in Liefke, 2024a,b) assumes that the content of all intentional mental states is propositional (Zimmermann, 2016; for a formulation of this view, see also Forbes, 2006 and Grzankowski, 2013, who however argue against it):[26]

Attitudinal propositionalism. All mental content is propositional/truth-evaluable.

In virtue of its propositional nature, this content can be expressed by a declarative sentence (e.g. (12a)), can be true (or false) at a circumstance of evaluation, @ (see (12b)), and can be shared by different cognitive agents (see (12c)).

(12) Elon {believes, wishes/hopes, imagines, sees} that Anna is buying a Tesla.
   a. 'Anna is buying a Tesla'
   b. 'Anna is buying a Tesla' is true at @ iff Anna is buying a Tesla at @
   c. Elon {believes, hopes} what Bob sees, viz. that Anna is buying a Tesla.

Attitudinal propositionalism has been endorsed for (the contents of) beliefs (Hintikka, 1969; Stalnaker, 1988; Stoljar, 1996), desires (Quine, 1956; Lemos, 1994; Sinhababu, 2015), imagination (Anand, 2011; Arcangeli, 2018; D'Ambrosio and Stoljar, 2021), and perception (Byrne, 2001; Speaks, 2009; Tye, 2002). Assuming that remembering is just another mental state,[27] attitudinal propositionalism also holds for episodic remembering.

On a semi-formal level, the propositional nature of mnemic contents is supported by the possibility of applying the 'content'-function, $[\![\cdot]\!]$, from Section 2.3 to a picture or scenario like Figure 3b/d ['swimmer own-eyes'/'from above'] (see (8), viz. by exploiting the analogy from Sect. 3.2). The resulting theoretical claim, which I will call 'mnemic propositionalism',[28] holds that all episodic memory content is propositional:

Mnemic propositionalism. All episodic memory content is propositional/truth-evaluable.

[26] Since Forbes and Grzankowski are concerned with attitudes towards individual objects (e.g. loving Mary, worshipping Zeus) – rather than with attitudes towards events or episodes –, the details of their negative arguments are not relevant here (but see Liefke, 2021; D'Ambrosio and Stoljar, 2021).

[27] This assumption is trivially satisfied on a continuist view of remembering and imagining (see e.g. Addis, 2020; Michaelian, 2016b; Michaelian et al., 2020) – at least so long as we hold that imagination content is propositional.

[28] In (Sant'Anna, 2018), this view is called 'the propositional attitude (PA) view of episodic memory'.

Propositionalism about episodic memory contents is endorsed, e.g., by Bernecker (2010, 2017), Byrne (2010), Fernández (2006, 2017, 2024b), and Liefke (2024a) (see also Sakuragi, 2013; Stephenson, 2010b).

4.1 Merits of mnemic propositionalism

Mnemic propositionalism is motivated by the same considerations that support the general adoption of attitudinal propositionalism. These include the observation that the propositional nature of episodic memory contents straightforwardly accounts for the intuitive truth- (or falsity-)conditions of these contents (see Fernández, 2006, 2017): Intuitively, if Elon remembers Anna buying a Tesla, what Elon remembers (viz. that Anna was buying a Tesla) is true or, respectively, false at the actual world, @. In particular, if Anna was, in fact, buying a Tesla in @, what Elon remembers is true. If Anna was not buying a Tesla in @, what Elon remembers is false. When combined with the common conception of propositions as the primary bearers of truth-values (Frege, 1997), this observation directly supports the propositional nature of episodic memory contents (Fernández, 2006; see Sant'Anna, 2018, p. 2).

Like general attitudinal propositionalism, mnemic propositionalism is further supported by the availability of a uniform account of different mental states (see Montague, 2007). 'Classical' work in the philosophy of language and mind endorses a relational view of mental states, which analyzes these states as binary relations between agents [= attitude holders] and intentional attitude contents or objects [= propositions] (Frege, 1997; Hintikka, 1969; Stalnaker, 1999; see also Blumberg, 2018). Since propositions are finely-grained[29] entities with strict identity-conditions, they straightforwardly explain the referential opacity of some of these states (see Quine, 1956; Szabó, 2005). By generalizing the relational view to states like imagining and episodic remembering, philosophers allow applying this explanation to experiential attitudes.

Beyond the above – and more specific to the attitude of remembering –, generalizing propositionalism makes available an easy account of semanticization and, more generally, of the relationship between episodic and semantic memories: It is often assumed that semantic remembering has propositional content (Aronowitz, 2024; Byrne, 2010; see also Sant'Anna, 2018, p. 5). By assuming that episodic memory is likewise propositional, mnemic propositionalism treats episodic and semantic memory contents as entities of the same type. This treatment is in line with the observation (due to Devitt et al., 2017; Greenberg and Verfaellie, 2010) that the seeming semantic/episodic 'distinction' is, in fact, a continuum of differently informational and perspectival contents.[30] In particular, while the contents of paradigmatic cases of episodic memories are informationally rich and perspectival (in the twofold sense discussed in Sect. 3.1),

[29] Expectedly, the granularity of propositions varies with the adopted account of propositions – especially with whether propositions are taken to be ontological primitives (see e.g. Pollard, 2015) or are analyzed as sets of possible worlds (Hintikka, 1969; Greenberg, 2021) or of (possible or impossible) situations (Kratzer, 2019 resp. Zalta, 1997). While picture semantics identifies propositions with sets of possible worlds (or, in my generalized version from Sect. 2.3, with sets of *situations*), it is compatible with the assumption of sets of impossible worlds as well as of primitive propositions. (For the latter, one would only need to inverse the relation between propositions and worlds, and identify a picture's content with the most informative proposition that is true at all worlds/situations; see Liefke, 2025, pp. 39–40.) However, to avoid restricting the scope of my proposed account, I refrain from adopting a particular view of propositions.

[30] For the relation between propositional contents and perspective, see Section 4.3.

the contents of paradigmatic cases of semantic (i.e. 'fact-only') memories are informationally poor and non-perspectival. An example of a semantic and an episodic memory content are given in (13a) and in (13b), respectively.

(13) a. 'A man is swimming.'
b. 'A man is swimming in a body of bubbly blue water. His left arm is stretched out; his left hand is/appears smaller than his arm ...'

Note that the semantic content from (13a) is properly contained in the episodic content (13b). In light of this inclusion, semanticization can be understood as the informational depletion of – and abstraction from – formerly episodic memory contents. This depletion can take the form of an elimination of perspectival information (see (14)), or of a general reduction of (perspectival and non-perspectival) information (with (13a) or (15a–c) being the limiting case).

(14) 'A man is swimming in a body of bubbly blue water. His left arm is stretched out ...'

(15) a. 'Someone is swimming.' b. 'There is a swimmer.' c. 'There is a man.'

Accounts which assume that semantic and episodic memory content are different kinds of entities (e.g. propositions *vis-à-vis* scenarios) resist this straightforward account of semanticization as informational depletion.

The above merits of propositional memory contents notwithstanding, Sant'Anna has recently identified a number of challenges for mnemic propositionalism (in Sant'Anna, 2018). These include the difficulty of accounting for the informational richness and partial falsity of episodic memory contents (see Sect. 4.2) and for the perspectivity of episodic memory contents (see Sect. 4.3, 4.4). The different challenges and their answers are described below. My answers show that picture semantics enables a principled defense of mnemic propositionalism that preserves the above-presented merits.

4.2 The challenge from partly-false contents

Sant'Anna (2018) starts his critical discussion of mnemic propositionalism by observing that episodic memory contents do not share the truth-evaluation behavior of 'classical' propositions (e.g. (13a), copied in (16a)): While classical propositions are commonly assumed to be either entirely true or entirely false, "a memory [often] possesses elements that are true and elements that are false at the same time" (Sant'Anna, 2018, p. 3). This is due to the constructive nature of episodic simulation (which often involves the addition of new contents that are false or undefined [= neither-true-nor false][31] and to the attendant informational richness and homogeneity of episodic memory contents. As a result of this richness, memory contents take the form of large conjunctive propositions. Since the falsity of one conjunct brings about the falsity of the entire conjunction, the falsity of even a small part of the mnemic content effects the falsity of the entire content. Since "memory errors occur more often than we suppose", this would entail that the majority of our memories are "simply false" (Sant'Anna, 2018, p. 3) – contrary to our intuition.

[31] The latter is the case for true contents that were not part of the original episode or its experience by the rememberer.

(16) a. A man is swimming.

b. A man with blond hair is swimming. His left arm is stretched out. There is kelp in the water.

An example of rich (conjunctive) memory content is given in (16b). The richness of this content is evidenced by the observation that it represents multiple individuals or objects (viz. a swimmer, the water, a kelp plant) that exemplify various properties (for the swimmer: e.g. 'has blond hair', 'has a stretched-out left arm') and stand in various relations (for the swimmer and the water: 'swims in').

Figure 6: A representation with the content from (16b)

Assume that Figure 6 is a mnemic representation of the original episode, e, in Figure 3d ['swimmer from above'].[32] The content of this representation is given by the conjunction of (17a), (17a-i)–(17a-iii), and (17b). Of this content, (17a), (17a-i), and (17a-ii) are true (**T**) at e. Since the swimmer in e has brown – not blond – hair, (17a-iii) is false (**F**) at e. Because there is no kelp in (the part of the ocean that belongs to) e, (17b) is likewise false at e. The falsity of (17a-iii) and (17b) makes the complex content in (16b) (partly) false.

(17) a. Someone is swimming. (**T**)
   i. The swimmer is a man. (**T**)
   ii. The swimmer's left arm is stretched out. (**T**)
   iii. The swimmer has blond hair. (**F**)
   } (**F**)
b. There is kelp in the water. (**F**)

From the possibility of partly-false memory contents like (16b) and the common assumption that propositional truth is an "all-or-nothing notion" (p. 3), Sant'Anna concludes that the contents of episodic memory cannot be propositions. Since the notion of accuracy allows for the missing 'partiality' or gradability, he suggests that "the content of memory is best understood in terms of accuracy conditions" (Sant'Anna, 2018, p. 3).

Sant'Anna acknowledges that one could try to save mnemic propositionalism by identifying propositional conjuncts according to the (individuals or) subevents about which they carry information. This strategy would split (16b) into two conjuncts, viz. (18a) (which carries information about the swimmer) and (18b) (which carries information about the water, or the kelp plant). However, apart from leaving the exact criteria

[32] To avoid printing further figures, I here treat Figure 3d ['swimmer from above'] as the original episode/situation from a viewpoint, rather than as a representation itself (as which it was introduced in Sect. 2.3). However, this is for practical purposes only.

for such identification underspecified – and apart from challenging the assumption that episodic memory targets a single coherent episode (Sant'Anna, 2018, p. 4) –, this strategy still fails to capture the partial falsity of some intuitively true memories.

(18) a. A man with blond hair is swimming with his left arm stretched out. (**F**)
b. There is kelp in the water. (**F**)

Answer. I believe that Sant'Anna's dismissal of mnemic propositionalism arises from a combination of three issues, against all of which it can be defended by using core ideas from picture semantics. These issues are (i) the designated role of truth-at-an-episode, (ii) the difference between truth and accuracy, and (iii) the gradability of propositional truth. Since it touches on one of the most basic building blocks of picture semantics, I start with a discussion of (i):

4.2.1 Truth at an episode

A central merit of picture semantics lies in its distinction between truth-at-the-actual-world and truth-at-a-situation (or episode).[33] In virtue of this distinction, the content of a picture can be true of its underlying situation (plus perspective) even if it is false at the actual world (see esp. Greenberg, 2018). An example of this difference is provided by Picture 1a [Tenniel's *The Gryphon*]:[34] Assuming that Tenniel's Gryphon does not have any property that is not also exemplified by the fictional gryphon in Carroll's fictional universe, e_{alice}, the informationally rich content of *The Gryphon* is true at e_{alice}. However, since gryphons (including the Gryphon from 'Alice's Adventures in Wonderland') do not exist in the real world, @, this content is false (or undefined) at @.

The distinction between truth-at-@ and truth-at-an-episode has immediate consequences for Sant'Anna's argument against mnemic propositionalism. This is even the case for real-world episodes – so long as these episodes are proper spatial and/or temporal parts of @. Assume that Figure 6 ['swimmer with kelp'] is, in fact, an accurate representation of the actual world at the point in time of e. Still, since there is no kelp in the smaller (!) part of the ocean that belongs to e, (17b) ['There is kelp in the water'] is false at e, even if it is true at @. Since many contemporary accounts of episodic memory do not carefully distinguish between the actual world and the originally experienced past episode (above, e; but see Michaelian, 2024b; Werning and Liefke, 2024), they cannot capture this difference in truth-evaluation.[35] I will return to the distinction between truth-at-@ and truth-at-an-episode in Sections 5 and 6.

4.2.2 Gradable truth

I have previously assumed with Sant'Anna that truth is a binary notion: For every pair of a proposition and an evaluative circumstance, it holds that the proposition is either

[33] This is a basic distinction that is exploited, e.g., in modal and possible world/situation semantics (see e.g. Kripke, 1963, 1981; Kratzer, 2012; Muskens, 1995). Since older accounts of pictorial content do not incorporate this distinction – and hence, have a severely limited explanatory scope –, this distinction plays a special role in picture semantics.

[34] Observe the interesting use of the definite article in the picture's title.

[35] Note that the difference between truth-at-@ and truth-at-an-episode equally shows for semantic memory (see Sant'Anna, 2018, p. 4). The fact that semantic and episodic memory contents display a very similar truth-evaluation behavior can be interpreted as further support for mnemic propositionalism.

true at this circumstance (s.t. the circumstance serves as a truthmaker for this proposition) or is false at this circumstance (s.t. the circumstance serves as a falsemaker for the proposition). However, a good argument can be made for the introduction of further truth-values – especially for the undefined truth-value **N** (i.e. 'neither-true-nor-false'). Such argument starts from boundary extension cases like the one in the previous paragraph (see Intraub et al., 1992). It uses propositions like (19), which explicitly refer to a part of the original episode that lies *outside* of the rememberer's original field of vision or experience. In particular, since e does not contain any location six feet behind the swimmer, it can neither make (19) nor its negation (i.e. 'Six feet behind the swimmer, there is no kelp in the water') true. As a result, the truth-value of (19) is undefined (**N**) at e. This assignment follows truth-evaluation in situation semantics (Barwise and Perry, 1983; Kratzer, 2002; Muskens, 1995) and in truthmaker semantics (Fine, 2017; Jago, 2020; Moltmann, 2020).

(19) Six feet behind the swimmer, there is kelp in the water. (**N**)

The possibility of assigning an element/conjunct of a mnemic content the undefined truth-value, **N**, already presumes that propositional truth is not binary – contrary to what is assumed by Sant'Anna (and in line with Frege, 1997 and much work in contemporary philosophy of perception and mind). In fact, in the last fifty years, work in philosophical logic, semantics, and the philosophy of language has proposed to extend the set of the familiar truth-values from '**T**' and '**F**' via '**N**' (see Russell, 1905; Łukasiewicz, 1930; Muskens, 1995) to 'both-true-and-false' (**B**) (which would enable an extension to self-contradictory non-veridical episodes like some dreams and hallucinations; see Priest, 2016; Berto and Jago, 2019; Michaelian, 2024b, and my Sect. 5.2), to truth-multi-values (e.g. Shramko and Wansing, 2012), to 'fuzzy' truth-values[36](Zadeh, 1975), and – eventually – to probabilities (van Eijck and Lappin, 2012; Henderson, 2021). The assumption of more truth-values – and of different algebraic structures on these truth-values – opens up a way out of Sant'Anna's predicament that most memories turn out to be false. For example, by interpreting conjunction as 'meet' not in a logical lattice (in which $\mathbf{T} \cap \mathbf{F} = \mathbf{F}$), but in an approximation lattice (in which $\mathbf{T} \cap \mathbf{F} = \mathbf{N}$; Blamey, 1986), we avoid the conclusion that all memories with a false element are false.

Admittedly, as is apparent from the value '**N**' of the conjunction in the previous paragraph, the adoption of a different algebraic structure on truth-values does not straightforwardly render the memory true. This would be the case for the complex mnemic content in (20), which – while not false – would still be judged 'neither-[all-]true-nor-[all-]false' (since, in an approximation lattice, $\mathbf{N} \cap \mathbf{F} = \mathbf{N}$).

(20) a. Someone is swimming. (**T**)
  i. The swimmer is a man. (**T**)
  ii. The swimmer's left arm is stretched out. (**T**)
  iii. The swimmer has blond hair. (**F**)
  b. Six feet behind him, there is kelp in the water. (**N**)

  } (**N**)

[36]Intuitively, fuzzy truth-values are values on the continuous interval $[0, 1]$.

While this is perhaps less far-removed from our intuitions about the truth of memories, the following consideration will likely shift the truth-value judgement about the mnemic content further to **T**: Sometimes, the falseness of a part of the mnemic content is not due to the falsity of the supplemented new information (during constructive simulation), but to the agent's distorted perception of the original episode. This is the case when what the episode *looked* or *felt* like (e.g. in Fig. 3d ['swimmer from above'], the swimmer is/seems to be missing a pair of legs) is different from what the episode *was* actually like (in Fig. 3c, the swimmer is not missing a pair of legs). By distinguishing the perspectival object of the agent's past experience (i.e. the 'subjective episode') from the ('objective') episode itself (as I have proposed in Sect. 3.2) – and by evaluating memory truth at the rememberer's subjective episode –, one can avoid judging contents like the one in the above example as 'false'.

4.2.3 Truth vs. accuracy

My elaborations from the previous subsection already suggest that partiality or gradability may not be the key argument in favor of replacing truth by accuracy. As Sant'Anna himself observes, the notions of truth and mnemic accuracy can – and do – come apart. This is evidenced by cases in which "the presence of inaccurate elements in memories [does not] impl[y] that they are false" (Sant'Anna, 2018, fn. 3). Assuming an authenticist notion of accuracy (see Bernecker, 2010; McCarroll, 2018) – a version of which is also adopted in picture semantics (see Greenberg, 2018) –, these cases include memories from veridical experiences with a displaced [= different-from-original] perspective.[37] They are exemplified by the mnemic scenarios in Figure 3b ['swimmer own-eyes'] (same/similar source, different mode) and in Figure 3d ['swimmer from above'] (different source, different mode) – assuming that these scenarios represent the proprioceptive swimming episode from (10b). While the content of such memories may still be true (in whole, or in part) at the actual world, it will likely include some content that was not included in the content of the original experience (s.t. it is either false or neither-true-nor-false of this experience).

The difference between truth and accuracy is perhaps even more apparent in memories from non-veridical experiences like dreaming and hallucination (see e.g. Liefke and Werning, 2023): Given the non-veridicality (or counterfactuality) of these experiences, their content will be false at the actual world, @. However, this does not change the fact that these contents can still be accurately recalled in episodic memory (s.t. the scenario does not include any – or only few – contents that were not included in the dreamt or hallucinated episode, or in the rememberer's original experience thereof). In virtue of the above, whether (some specific informational part of) a memory content is true at the actual world is a different question from whether it accurately represents the past episode or its experience. By rigorously distinguishing between @, the (subjective) target of a picture [/scenario], and its (objective) component situation [/episode] (Greenberg, 2018, 2021), picture semantics captures this distinction.

This completes my picture-semantic defense of mnemic propositionalism against Sant'Anna's challenge from partly-false contents. I next show that picture semantics also helps answer Sant'Anna's challenge from perspectival contents:

[37] The term 'displaced perspective' is taken from D'Ambrosio and Stoljar (2023).

4.3 The challenge from perspectival contents

To strengthen his case that "the [propositional attitude] view offers an inadequate view of memory content" (p. 7), Sant'Anna (2018) further argues that mnemic propositionalism fails to capture the phenomenon of perspective shifting (see e.g. Nigro and Neisser, 1983; Rice and Rubin, 2009, 2010; McCarroll, 2018). This phenomenon paradigmatically includes cases in which a first-person (or 'field'-) perspective experience like the one in Figure 3b (in which the experiencer, e.g. his eyes, provides the perspectival source) is recalled from a third-person (i.e. onlooker-, or 'observer'-) perspective, thus yielding a scenario like the one in Figure 3d. Specifically, according to Sant'Anna,

> Field and observer memories pose a problem to the P[ropositional]A[ttitude] view [of episodic memory] because the events or states of affairs that they represent are arguably the same. This means that the field memory [...] and the observer memory [...] that I have of eating lasagne last Saturday have the same proposition as their contents, i.e., they are true under the same conditions. (p. 5)

My description of the picture-semantic mechanism for obtaining representational contents (see Sect. 2.3) should already have made clear that the above is not the case. This is evident from the assumption that only Sant'Anna's observer-memory scenario – but not his field-memory scenario – contains Sant'Anna himself, as seen "from the outside" (Sant'Anna, 2018, p. 5; cf. Vendler, 1979). This difference between scenarios will be reflected in their respective contents. Thus, in an intuitive sense, only the observer scenario – but not the field scenario – carries information about the shape of the back of Sant'Anna's head and neck, and about the exact color of his hair. Yet, both scenarios can be described by the proposition 'I am eating lasagna' (uttered by Sant'Anna).[38]

A close analogue of Sant'Anna's example is provided by the representations in Figures 3b ['swimmer own-eyes'] and 3d ['swimmer from above']. My formal account of the contents of these representations (in (8a/b)) shows that these contents – while propositional – are <u>not</u> true under the same conditions (contra Sant'Anna, 2018): There exists at least one situation at which (8a) (copied below) is true, but at which (8b) is false (or *vice versa*). An example of such situation is a scene in which a blond man with a sleeveless wetsuit is swimming.

(8) a. 'A man is swimming in a body of bubbly blue water. His left arm is stretched out; his left hand is smaller than his arm ...'

b. A young man swims in a body of blue water. His left arm is stretched out; he has short brown hair and a tanned back ...'

Since the perspectival source, v_3 ['own-eyes'], in Figure 3a makes all but the swimmer's left arm and hand representationally irrelevant, the content of Figure 3b ['swimmer own-eyes'], i.e. (8a), is true at this scene. Since the source, v_4 ['onlooker'], in Figure 3c places a representational emphasis on larger parts of the swimmer's body – such that there is a mismatch between the swimmer's clothing and hair color in the scene and in the represented episode –, the content of Figure 3d ['swimmer from above'], i.e. (8b), is false at this scene.

[38] It is likely this observation that led Sant'Anna to believe that a field- and an observer memory of the same episode have the same propositional content.

Because the function $[\![\cdot]\!]$ identifies a representation's content relative to the perspectival source and mode for which this representation was obtained, it straightforwardly captures "[the] difference in what it is like for subjects to [field]-remember an event and [observer]-remember the same event" (Sant'Anna, 2018, p. 6; see e.g. (8a)/(9) vs. (8b)). This difference is sometimes revealed by the kinds of properties that figure in these contents. Thus, the presence of visually perceivable properties in (8b) (e.g. color: blue, brown, tanned; direction: left; shape: short, stretched out) suggests a visual mode (i.e. what the episode *looked* like [from the experiencer's viewpoint]). The presence of bodily perceivable properties in (9c) suggests a kinesthetic or proprioceptive mode (i.e. what the episode *felt* like; see D'Ambrosio and Stoljar, 2021).

4.4 The challenge from *de se*-contents

I close this section with a discussion of propositionalism's compatibility with the observation that memories like the ones in (21) or (22) are essentially (!) about the rememberer (s.t. they are self-directed, self-locating, or *de se*; see e.g. Burge, 2003; García-Carpintero, 2024; Salje, 2024). In the 'eating lasagna'-memory from the quote on the previous page, this self-directedness is reflected in Sant'Anna's awareness that it is *he* who is eating lasagna: Intuitively, Sant'Anna would not use (21) to report a mere field-perspective simulation of someone with his kind of hands, sitting at a perfect replica of the Sant'Annas' dining table, using the Sant'Annas' tableware.[39]

(21) I was eating lasagna. (uttered by Sant'Anna)

(22) a. Sant'Anna remembers eating lasagna.

b. Sant'Anna remembers himself eating lasagna.

The difference between *de se*-memories and mere field-perspective simulations can be captured by Lewis' (1979) analysis of *de se*-contents like (21) as properties (here: 'eating lasagna') or, equivalently, as centered propositions (here: 'x is/was[40] eating lasagna'; see also Castañeda, 1966; Perry, 1979). Centered propositions differ from classical propositions (e.g. (23a)) in being dependent on an additional parameter besides the world/situation parameter (s), viz. on an individual parameter (x) (called the *individual center*). In virtue of this parameter, centered propositions are analyzed as sets of centered worlds/situations (see (23b)). The members of such sets are situation-individual pairs $\langle s, x \rangle$, where x is the individual center of s (see Ninan, 2010; Stephenson, 2010a).

(23) a. $[\![\text{Sant'Anna is eating lasagna}]\!] = \{s : \text{Sant'Anna is eating lasagna in } s\}$
$\equiv \{\langle s, x \rangle : \text{Sant'Anna is eating lasagna in } s\}$

b. $[\![\text{I am eating lasagna}]\!] = \{\langle s, x \rangle : x \text{ is eating lasagna in } s\}$

The modelling of *de se* through centered situations has a straightforward application to pictorial contents (in (24): to the content of the representations in Figures 3b ['swimmer own-eyes'] and 3d ['swimmer from above']). This application replaces all reference to the salient individual in the represented episode (in Fig. 3b/d: the swimmer)

[39] For more examples of this sort, the reader is referred to, e.g., (Kaplan, 1989, esp. pp. 533, 537), (Perry, 1979), and (Percus and Sauerland, 2003).

[40] To keep this account as simple as possible, I here ignore tense.

by an individual variable, x. (This variable is then bound by the formation of sets of centered situations $\langle s, x\rangle$). This replacement effects a (self-)attribution of the representation's content to the rememberer (and, hence, a self-identification of the rememberer with the swimmer; see Sect. 7).

(24) non-*de se* a. $\left\{ s : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v} = \mathbf{T} \right\}$ = 'A man is swimming in a body of bubbly blue water. His left arm is stretched out; his left hand is smaller than his arm …'

field *de se* b. $\left\{ \langle s, x\rangle : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v,x} = \mathbf{T} \right\}$ = '**I** am swimming in a body of bubbly blue water. **My** arm is stretched out; **my** left hand is smaller than **my** …'

observer *de se* c. $\left\{ \langle s, x\rangle : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v,x} = \mathbf{T} \right\}$ = '**I** am swimming in a body of bubbly blue water. …; **I** have short brown hair and a tanned back …'

Given the above, it might look like a version of Sant'Anna's argument from perspective shifting (see Sect. 4.3) may hold for *de se* memories. This is so since – on a classical understanding of 'propositions' [= sets of worlds/situations] and 'truth-conditions' – the formulation of mnemic propositionalism from the introduction to the present section only allows for a single/simple evaluative parameter (thus excluding centered situations). However, since this argument is not fuelled by the difference between field and observer perspective – the shift from one to the other does not change the *de se*-ness of the memory (see (24b/c)) – and since *de se*-ness is a broader phenomenon that is attested in most attitudes, *de se* memory contents should not be regarded as a challenge for propositionalism. In fact, a simple generalization to multiple evaluative parameters salvages mnemic propositionalism. The resulting, broader, view of the propositional nature of memory contents[41] is given below:

Centered mnemic propositionalism. All episodic memory content is truth-evaluable relative to a situation and its individual center and, hence, can be analyzed as a centered proposition.

This completes my picture semantics-based defense of mnemic propositionalism. I will show in the next section that the tools and concepts from picture semantics also suggest a new approach to memories from non-veridical experiences like dreaming.

5 Application 2: dream memories

5.1 The paradigm: memories for veridical experiences

The vast majority of work in the philosophy of memory to date has focused on memories for veridical perceptual experiences (see Michaelian, 2024b, p. 168). The latter are memories of real-world episodes (e.g. the swimming event from Fig. 3a/c) whose inhabitants (in Fig. 3a/c: the swimmer) are actual particulars in the sense that they exist in the real world and that they have clear identity-criteria. The inhabitants' status as

[41] In (Liefke, 2024b, p. 18), this view is called 'Perspectivism'.

particulars ensures that the referentially explicit[42] version, (25a), of the content of Figure 3d from (8b) (which existentially quantifies over the swimmer) is equivalent to the referentially *specific* version in (25b). This version assumes that a certain man is such that, in the relevant mnemic scenario, he is swimming in blue water.

(25) a. $\left\{ s : \exists v \exists \boldsymbol{x}. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v,\boldsymbol{x}} = \mathbf{T} \right\} =$ '**Some** man **(or other)** swims in blue water. His left arm is stretched out; he has short brown hair and a tanned …'

$\equiv$ b. $\exists \boldsymbol{x}. \left\{ s : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v,\boldsymbol{x}} = \mathbf{T} \right\} =$ '**A certain** man swims in blue water. His left arm is stretched out; he has short brown hair and a tanned back'

The descriptions of the contents from (25a) and (25b) differ in that (25a) does not require the swimmer, x, to be the same in all situation-members of this set. In particular, the restrictor, $\exists v \exists x. \ldots = \mathbf{T}$, of the set in (25a) allows for members in which different, but similar-looking, individuals (with the physical properties from the right side of the equation in (25a)) are swimming. These include, e.g., a situation, s_1, in which Zeno is swimming and a situation, s_2, in which Zeno's identical twin brother, Timo, is swimming. Since Zeno and Timo share the same outward appearance and swimming style, Zeno's swimming in the ocean would – from a fixed vantage point – look exactly the same (viz. like Fig. 3d ['swimmer from above']) as Timo's swimming in the ocean (assuming the same location and similar water-/weather-conditions). As a result, the propositional content that is described by (25a) is non-particular (or 'arbitrary') with respect to the swimmer (Fine, 1985; see also Fodor, 1970; Forbes, 2006). The arbitrariness of the swimmer is captured by the phrase "some … or other" in (25a).

The above-described arbitrariness contradicts our intuitions about mnemic content in the case of memories for veridical experiences: Since an agent's episodic memory of the 'someone swimming'-event, e, from Figure 3a/c is about the particular swimmer whom the agent has (veridically) seen swim in the ocean, this memory and its content are specific with respect to the swimmer. This holds even if the agent was not previously acquainted with the swimmer, i.e. if he does not know who the swimmer is: Witnessing the swimmer in the actual world fixes the referent of 'swimmer' once and for all. The particularity of this referent is expressed by the phrase "a certain …" in (25b). In the description[43] of the content of Figure 3d, this particularity is captured by letting the existential individual quantifier $\exists \boldsymbol{x}$ scope over the operator, $\{\cdot\}$, that forms sets of situations. The wide scope of $\exists \boldsymbol{x}$ ensures that the swimmer is the same individual in all members of this set.

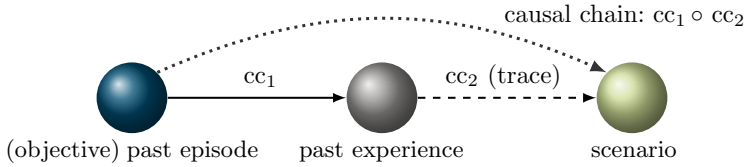
The particularity of the mnemic content in (25a) is central to causal theories of memory (CTMs) (e.g. Martin and Deutscher, 1966; Bernecker, 2010; Werning, 2020). CTMs assume a causal connection – sustained by a memory trace – that holds between the rememberer's original experience of an (objective event or) episode and his later, mnemic representation of this episode (see the dashed arrow in Fig. 7). Since veridical

[42] In contrast to (24c), this version existentially quantifies over the individual variable x. Since the resulting set has simple – not centered – situations as its members, it describes a classical proposition.

[43] In semantics and the philosophy of language, this description is called '*de re*' (see e.g. Sosa, 1970; Keshet and Schwarz, 2018; cf. Quine, 1956; Russell, 1910).

perceptual experiences are (presumed to be) causally related to their objects (i.e. the experienced past episode; see the solid arrow in Fig. 7), memory traces give rise to a causal chain that links the past episode with its mnemic representation (see the dotted arrow in Fig. 7). This chain straightforwardly 'inherits' the inhabitants of the episode (in the episode from Fig. 3a/c: the particular swimmer) to the episode's mnemic representation (i.e. the scenario). This inheritance of referents is made explicit in (26).

Figure 7: Causal connections (cc's) in memory from veridical perception



(26) $\exists \boldsymbol{x}$. Zeno has seen $\boldsymbol{x}$ & now remembers: $\left\{ s : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v,\boldsymbol{x}} = \mathbf{T} \right\}$

5.2 The challenge from non-actual objects

The situation is different for memories from experiences like (episodic) dreaming, imagining, and hallucinating (see e.g. Michaelian, 2024b).[44] Since these experiences are non-veridical,[45] their objects likely do not exist in the actual world. They are thus either abstract particulars (i.e. abstract object *tokens* like the particular Gryphon from Lewis Carroll's imagination; see (27) and my discussion in Sects. 3.2 and 4.2.1) or non-actual arbitrary objects, i.e. abstract object *types* (cf. Michaelian, 2016a; Sant'Anna, 2022; Zimmermann, 2016). Examples of the latter are given in (28) (due to Werning and Liefke, 2024, p. 127, see (28a); respectively to Michaelian, 2024b, pp. 157–158, see (28b)).

(27) Carroll remembers *the Gryphon* (from his imagination) dancing. (token)

(28) a. Pete remembers *an eagle* (in his dream) flying over his head. (type)

b. Michaelian remembers buying *a car* (in his dream) *that is both red and green all over*. (type)

Since object types have not (yet) received a closer discussion in the literature on memories for dreams – and since they come with their own specific challenges –, I discuss them separately in the next subsection.

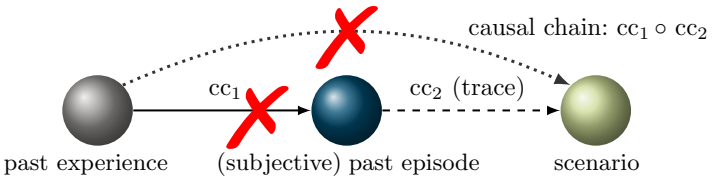
[44] I here follow Michaelian (2024b) in assuming that episodic dreams "are (or at least involve) representations" (p. 157) and that agents at least sometimes remember what they dream (see also Windt, 2013). However, these views are not uncontested. (For a position against the latter view, see e.g. Rosen, 2013).

[45] As a result of this non-veridicality, one cannot infer the actual truth of the experienced content from the experience. In particular, from 'a Vs that p', it does not follow that p(-in-@), where V $\in$ {dream, hallucinate, ...} (see Egré, 2008). Note that, by blocking this inference, non-veridicality is strictly weaker than anti-veridicality (or counterfactuality), which validates an inference from the experience to the actual *falsity* of the content of this experience (i.e. from 'a Vs that p' to $\neg p$(-in-@); see Jeong, 2020).

At a first glance, the replacement of an actual/real-world[46] episode (with concrete particular inhabitants; see (26)) by a non-actual – possible or impossible – episode (again, with particular inhabitants; see (27)) does not seem to change much about the overall picture of episodic memories: in either case, it looks, the referent will be inherited from the past episode to the mnemic scenario via a causal chain. However, at a second glance, this inheritance is subject to serious challenges. An initial such challenge arises from a common restriction of the notions of 'episode' and 'inhabitant' to real-world objective episodes and their actual inhabitants. Given the non-veridicality of dreaming, imagining, and hallucinating, this restriction makes the original past episode and/or its inhabitants unavailable. (The latter is also the reason why Figure 8 replaces 'objective' by 'subjective' episode and inverts the dependency relation between 'episode' and 'experience'). Michaelian (2024b) acknowledges this challenge when he notes, "in the case of dream memory, there is no 'originally experienced event' with respect to which the accuracy of the dream memory might be assessed" (p. 161).

At least for causal theories of memory (which crucially rely on an intact causal chain between the episode and the scenario), the non-existence (in @) of an objective past episode raises another serious challenge, viz. a breakdown of the causal chain from episodes to scenarios (see Werning and Liefke, 2024). It is commonly assumed that causal relations can only hold between events that are part of the same (actual or possible) world (Lewis, 1975; Bigelow and Pargetter, 1990). This entails that, even if the causalist grants the existence of non-actual events and individuals, he will still not be able to obtain a causal chain between the experience and its mnemic representation (see the crossed-out solid and dotted arrows in Fig. 8). This is so because the experience of this episode is still a real-world event (e.g. the dream*ing* took place in @), such that cc_1 would need to connect an actual with a counterfactual event.

Figure 8: Missing causal connections (cc's) in memory from dreams



Using a non-veridical, (27)-inspired variant of the example from (26), the challenge from Figure 8 is captured in (29). There, 'E' is a situation-relative existence predicate. '$\neg E_{@}(\boldsymbol{x})$' asserts that the referent of the individual variable $\boldsymbol{x}$ is not actual. The red strike through $\boldsymbol{x}$ indicates that $\boldsymbol{x}$'s referent cannot be causally inherited from the past experience to its subjective object, such that it can also not be inherited to the experience's mnemic representation (for reasons detailed in the previous paragraph).

(29) $\exists \boldsymbol{x}.\, \neg E_{@}(\boldsymbol{x})$ & C. imagined: $\{s'\colon \boldsymbol{x}..\}$ & rembers: $\left\{ s : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v,\boldsymbol{x}} = \mathbf{T} \right\}$

[46] Michaelian (2024b) calls such episodes 'occurrent events'. Counterfactual episodes are then described as 'nonoccurrent events'.

Answer. Picture semantics – or, more precisely, its underlying possible world- (or situation-) semantic framework (see e.g. Stalnaker, 1968; Kripke, 1981; Kratzer, 2012) – straightforwardly solves the restriction to real-world episodes and their inhabitants: By assuming the existence of possible (or even impossible) worlds, situations/episodes, and their inhabitants (for the latter, see (28b)), this framework immediately makes available the needed non-actual referents. Adopting a Kripke-style view of possible worlds – on which an individual can inhabit more than one world (Kripke, 1981; Kaplan, 1976) – then straightforwardly explains these referents' particularity.[47] Since, on this view, existence in the actual world is just a special case of existence in a possible world, the view further provides a uniform account of veridical- and non-veridical experience-based memories of particulars.

The possibility of solving the challenge from memories of non-actual particulars through the introduction of "potentially nonexistent events" is also acknowledged by Michaelian (2024b).[48] Thus, he writes,

> If [the objects of our episodic memories] are necessarily existent – in the case of events: occurrent – then they will not enable us to answer the question of what dreams are about. If they are potentially nonexistent or nonoccurrent, then they may enable us to answer that question [...]. (p. 168)

Picture semantics accounts for depictions of non-veridically experienced scenes in much the same way: To identify the content of a picture that has been produced by "an artist who undergoes a hallucination while drawing from life" (*ibid.*, p. 883), Greenberg (2018) distinguishes the situation, s_1, that serves as the picture's target (see Sect. 2.2) from the situations, s_2, that make true the picture's content. In the case of hallucination, only s_1, but not s_2, is part of the actual world, @ (*ibid.*, pp. 883–885).[49]

Since Greenberg's 'hallucination'-example only serves to illustrate the difference between the depicted object/situation and the picture's truthmakers, it is, in principle, indifferent about whether the depicted situation is objective (i.e. the situation itself) or subjective (i.e. its perspectival projection). This differs from the case of dreaming (see the variant of (27) in (30)), in which the 'intended' target (i.e. the objective episode, s_1) does not exist: There is no (actual or counterfactual) fact of the matter with respect to which the accuracy of a dream's pictorial representation can be evaluated. As Michaelian (2024b) notes, "in dreaming, the subject experiences, but he does not experience an [objective] event" (p. 8).

(30) Carroll is visualizing *the Gryphon* (from his dream) dancing.

The only available target of Carroll's visualization from (30) is his subjective oneiric scene (in which the Gryphon is displayed from a particular perspective). The absence of an objective situation is unproblematic so long as the dream-depiction is the representation of *some* (possibly a subjective) target. This observation has been taken into account in Figure 8 (which only contains a subjective, but not an objective, past episode).

[47] This particularity (see the wide scope of '$\exists \boldsymbol{x}$') and non-actuality (see '$\neg E_{@}(\boldsymbol{x})$') is made explicit in the semi-formal description in (29).

[48] Note however that, to avoid a commitment to non-actual particulars, Michaelian rejects this possibility.

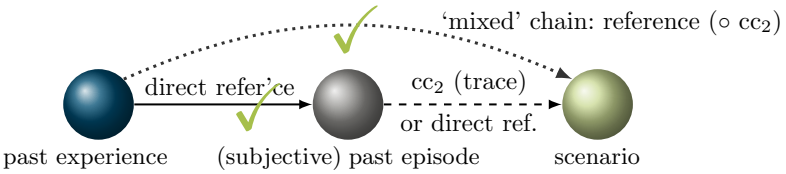
[49] I will return to a discussion of distortions of content in Sect. 6.

Arguably, at least for the causalist, the adoption of possible (objective or subjective) situations by itself still does not yet answer the challenge from a missing connection between the past experience and its perspectival target/episode (see the broken chain in Fig. 8). Picture semantics also suggests a way out of this problem, viz. replacing the causal connection between the past experience and the episode by a direct reference-relation between the salient objects in these events (in (30): the Gryphon; see Kaplan, 1989). Describing this relation, Greenberg (2018) remarks,

> In the language of Kaplan (1989), we might say that pictures are devices of *direct reference*, for the objects which they are *of* are not merely specified by an intermediary description (e.g., the attributive content), but are themselves parts of the content. (p. 886)

Since the relation of direct reference 'inherits' the objects directly from the past experience to the episode (and, subsequently, to the episode's mnemic representation), it does not demand that this object is descriptively identified by this experience.[50] The latter is needed to explain why Picture 1 c ['Mama'] is a picture of me, even though I do not exemplify any of the properties in the attributive content of this picture. It is also needed to account for the constructive nature of episodic simulation, as I will elaborate in Section 6. Assuming that reference is also preserved in causal relations (see Kripke, 1981), the combination of the direct reference-relation with the causal relation that is provided by the memory trace then obtains a connection between the past experience and the mnemic scenario (see Fig. 9).

Figure 9: Alternative connections in memory from dreams



Interestingly, the notion of direct reference can also be used to explain non-actual memory objects in post-causal theories like Michaelian's simulation theory of memory (STM; Michaelian, 2016b, 2021, 2024a; see De Brigard, 2014). To do so, one only needs to replace the (dashed) trace relation, cc_2, in Figure 9 by the assumption that constructive episodic simulation proceeds through the integration of (a representation of) the object of the direct reference. If, as Quiroga et al. (2006) have argued, such representations are provided by concept cells (i.e. networks of functionally connected neurons that encode for a particular individual or object),[51] episodic simulation can involve direct reference. Since concept cells also encode for fictional and non-existent objects (see Quiroga's (2012) 'Luke Skywalker' example), they straightforwardly account for non-actual memory referents.

[50] For an elaboration of this view (based on Maier, 2015; Blumberg, 2018, 2019), the reader is referred to (Werning and Liefke, 2024).

[51] It is for this reason that Quiroga (2012) describes concept cells as the "building blocks" of episodic memory.

Admittedly, in order to obtain a satisfactory application of the above ideas to causal and simulation theories of episodic memory, much more will need to be said about the exact nature of the direct reference relation, of concept cells, and/or of the particular way in which (representations of the objects of) direct reference can interact either with the causal memory trace or with the constructive episodic simulation process. However, the result even of the above, rough-and-ready, application is possibly not much less-developed than accounts of reference in the simulation theory of memory.[52] Thus, Michaelian (2024b) remarks, "If reference poses a problem for simulationism [...], the problem that it poses is not specific to memory for dreams but will arise regardless of the nature of the corresponding earlier experience" (p. 158, fn. 6).

5.3 The challenge from non-particular objects

The challenge from non-veridical experiences becomes more acute when one considers experiences of non-particular, unspecific objects (i.e. of object *types*). This is so since many theories[53] that have no objections to assuming (actually or counterfactually) nonexistent (i.e. possible or impossible) objects are hesitant to extend their commitments to non-particular, or arbitrary, objects. The latter are objects like 'the' eagle from Pete's dream in (28a) that are not only unspecified with respect to whether or not they have certain properties – they lack clear identity-conditions (as discussed in Sect. 3.2): when presented with a convocation of eagles, Pete would not be able to identify which of them (if any) was the eagle from his dream.

Note that arbitrary objects likes the eagle in (28a) are not specific to memories from non-veridical experiences. Rather, they can figure in any episodic-like memory[54] that contains different individuals from multiple repeated events (i.e. which have the same role/function/properties in these events), such that this memory is temporally unspecific. These memories include Neisser's (1981) 'repisodic memories', Andonovski's (2020) 'non-singular memories', and Conway's (1990) 'generic autobiographical memories'. An example of such memories is given in (31). There, '#' indicates a sentence's deviant meaning.

(31) I remember eating a fresh croissant every morning when I visited Paris.

≡ a. I remember eating a particular *type* of food, viz. a fresh croissant – a different (freshly baked) one each day –, every morning when I visited Paris.

≢ b. #For a certain (particular *token*(!) of) fresh croissant, I remember eating it every morning when I visited Paris.

To account for intuitively plausible cases like the ones in (28) and (31), one could bite the bullet and accept arbitrary objects (incl. the generic fresh croissant) into ones' ontology. (The resulting account would be a close analogue of (29) (see (32b)), where the individual variable $\boldsymbol{x}$ would range over the union of particular and arbitrary objects.)

[52] But see the recent efforts towards a simulationist theory of reference in remembering in (Openshaw and Michaelian, 2024).

[53] These theories include (Werning and Liefke, 2024), but exclude (Michaelian, 2024b).

[54] This is a memory with the phenomenological properties of paradigmatic cases of episodic memory. Such properties include rich mental imagery (Addis et al., 2008; Mahr, 2020), experience-likeness (Cheng et al., 2016; Harman, 1990), perspectivity (Nigro and Neisser, 1983; McCarroll, 2018), and a sense of self (Klein and Nichols, 2012; Tulving, 2005).

(32) a. $\left\{ s : \exists v \exists \boldsymbol{x}. \left[\!\left[\text{  } \right]\!\right]^{s,v,\boldsymbol{x}} = \mathbf{T} \right\} =$ 'I am eating **some** butter croissant **(or other)** from La Maison d'Isabelle. It is nice and crunchy, extremely buttery'

$\not\equiv$ b. $\exists \boldsymbol{x}. \left\{ s : \exists v. \left[\!\left[\text{  } \right]\!\right]^{s,v,\boldsymbol{x}} = \mathbf{T} \right\} =$ 'I am eating **a certain** butter croissant from La Maison d'Isabelle. It is nice and crunchy, extremely buttery, …'

However, the situation-semantic account of pictorial contents from Section 2.3 makes the adoption of such arbitrary objects unnecessary: Since this account analyzes representational contents as sets of (actual and possible) situations, it can treat mnemic representations of arbitrary objects as sets of situations with different – but functionally equivalent – inhabitants/objects (analogously to my 'Zeno and Timo swimming'-example from Sect. 5.1). For the croissant case from (31), this analysis is given in (32a).[55] Because the memory that is reported in (31) is not about a particular individual croissant, the content of this memory cannot be captured by the analysis from (32b) (contra what I have argued for the 'certain swimmer'-swimmer case in (25a)). Since situation semantics can be extended to impossible situations (Greenberg, 2018; see Berto and Jago, 2019; Moltmann, 2021), the analysis from (32a) even accounts for impossible non-particulars like Michaelian's simultaneously red and green car (see (28b)).

I close this section with a comment on an alternative approach to cases like (28a) and (28b) (due to Michaelian, 2024b) that seeks to avoid a commitment to non-actual and arbitrary individuals or events by replacing them by 'intentional objects'. The latter are objects "[without] ontological status" (p. 168) that are "potentially nonexistent or nonoccurrent" (p. 168) and "[what] a dream […] is about" (p. 168). Since Michaelian adopts Crane's (2001) deflationary view of intentional objects, his intentional objects are importantly "not a kind of entity" (p. 168), such that "the question of their ontological status […] does not arise" (p. 168).

Initially, in virtue of the above, it looks like Michaelian's approach to the objects of dream memories answers the above-discussed challenges. However, even if one neglects the uncanny nature of the deflationist's intentional objects (recall Quine's (1948) dictum "no entity without identity"), Michaelian's approach does not measure up to the demands posed by these challenges. In particular, this approach cannot distinguish between non-actual, but particular objects (like the Gryphon in (27)/(30)) and non-particular, arbitrary objects (like the croissant in (31)). Because only representations of particulars (incl. non-actual particulars) can receive a quantifier wide-scope analysis like (29) (see the equivalence in (25) and the non-equivalence in (32)), picture semantics straightforwardly affords this distinction.

6 Application 3: mnemic accuracy

Much recent work on episodic memory has focused on mnemic accuracy (see e.g. Bernecker, 2010; McCarroll, 2018; Michaelian, 2016b, 2024b; Michaelian and Sant'Anna, 2022). Accuracy is this part of the success-conditions of episodic memory which concerns whether the memory correctly represents its (objective or subjective) target. Be-

[55] Image source: Susan. 24 Sept. 2024. https://midlifeglobetrotter.com/best-paris-croissants/.

low, I first review competing views of accuracy in memory and their respective motivations (in Sect. 6.1). I will show that picture semantics straightforwardly accommodates these different views, while answering Michaelian's (2024b) challenge from accuracy in memories from non-veridical experiences (see Sect. 6.2). I will then argue that, by allowing the identification of different accuracy classes (with differently strong requirements on accuracy), picture semantics also answers the challenge from varying standards of mnemic accuracy (a phenomenon that has been observed, in different forms, by Perrin and McCarroll (2024) and Camillo (2024); see Sect. 6.3).

6.1 Competing views of mnemic accuracy

Following Bernecker (2010), views on mnemic accuracy divide according to how they identify the intuitive target of the mnemic representation: While Bernecker's own position – viz. (classical) authenticism – identifies this target *both* with the (objective) past episode and with (the subjective object of) the agent's experience of this episode (see also Bernecker, 2015; McCarroll, 2018),[56] a prominent recent position – Michaelian and Sant'Anna's (2022) alethism – identifies this target only with the episode itself (see also Michaelian, 2016b, 2021; Sant'Anna, 2024). A competing position – which Perrin and McCarroll (2024) dub 'radical authenticism', and attribute to Newby and Ross (1996) – identifies the target only with (the subjective object of) the agent's past experience.

The above positions characterize mnemic accuracy as truth (alethism), as authenticity (radical authenticism), and as truth plus authenticity (classical authenticism). They hold that a memory is accurate if its representational content is true of the (objective) past episode (alethism), of the agent's (subjective) original past experience of this episode (radical authenticism), or – respectively – of the past episode *and* the agent's past experience of this episode (classical authenticism). Strict (i.e. non-constructive) versions of the different views of mnemic accuracy are summarized below. There, 'MC', 'EC', and 'ExpC' stand for '<u>M</u>nemic (i.e. scenario) <u>C</u>ontent', '(past) <u>E</u>pisode <u>C</u>ontent', and '(past) <u>Exp</u>erience <u>C</u>ontent', respectively.

Strict alethism. An episodic memory is accurate if it only includes content that is true of the (objective) past episode. ➥ MC $\subseteq$ EC

Strict radical authenticism (cf. Greenberg, 2018)**.** A memory is accurate if it only includes content that is true of the agent's (subjective) past experience of this episode. ➥ MC $\subseteq$ ExpC

Strict classical authenticism (Bernecker, 2010)**.** A memory is accurate if it only includes content that is true of the (objective) past episode and of the agent's (subjective) past experience of this episode. ➥ MC $\subseteq$ EC & MC $\subseteq$ ExpC

Historically, classical authenticism has been the default view of mnemic accuracy. However, in recent years, this view has been challenged by the observation that it predicts the inaccuracy of observer memories (Nigro and Neisser, 1983; Rice and Rubin, 2009; see Sect. 4.3).[57] This also holds for other constructive memory phenomena like false

[56] According to Bernecker (2010), "a memory [...] must accord not only with objective reality but also with one's initial perception of reality" (p. 214).

[57] To answer the challenge from observer memories, McCarroll (2018) argues that observer perspectives are already available at the time of (constructive) encoding. For a critical discussion of this argument, the reader is referred to (Michaelian and Sant'Anna, 2022).

recognition (Deese, 1959; Roediger and McDermott, 1995), integration (McClelland et al., 1995), and boundary extension (Intraub et al., 1992): Since these phenomena introduce novel content that was not part of the agent's original experience, they do not satisfy the requirement that all mnemic content be included in the past experience content (i.e. not: MC $\subseteq$ ExpC). Because radical authenticism likewise requires that mnemic content be included in the agent's experience content, observer memories also challenge radical authenticism.

Note that, since constructive memory phenomena often introduce content that was also not part of the *objective* past episode, these phenomena likewise pose a challenge for the strict version of alethism. For alethism, this challenge is usually answered by relaxing the accuracy-conditions.[58] Such relaxation is achieved by replacing 'only includes' by 'mostly includes' (denoted by '$\between$') in the definition of strict alethism, where the threshold for content-inclusion is contextually defined:

Alethism (Michaelian and Sant'Anna, 2022)**.** A memory is accurate if it mostly includes content that is true of the (objective) past episode. ➥ MC $\between$ EC

In an attempt to accommodate constructive memory phenomena, authenticists (following Bernecker, 2015) have proposed an analogous relaxation of accuracy-conditions (see especially Dings et al. (2023), who assume that the threshold for authenticity is modulated and constrained by context):

Radical authenticism. A memory is accurate if it mostly includes content that is true of the agent's (subjective) past experience of this episode. ➥ MC $\between$ ExpC

Classical authenticism (Bernecker, 2015; McCarroll, 2018)**.** A memory is accurate if it mostly includes content that is true of the (objective) past episode and of the agent's (subjective) past experience of this episode. ➥ MC $\between$ EC & MC $\between$ ExpC

Given a low such threshold, the resulting account may even capture cases like (9c) and (24c) (copied in (33a/b)), in which the agent's original experience (see (33a)) only shares very little content with its mnemic representation (in (33b)). Problematically however, this account still fails to explain the novel content's systematicity. After all, this content does more than add individual pieces of information – it yields a whole new, coherent, perspective.

(33) a. $\left\{ \langle s, x \rangle : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v,x} = \mathbf{T} \right\}$ = 'I am swimming. The current is pulling on my legs. I feel the adrenaline. My arms are engaged in a crawl …'

$\not\supseteq$ b. $\left\{ \langle s, x \rangle : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v,x} = \mathbf{T} \right\}$ = 'I am swimming in blue water. My left arm is stretched out. I have short brown hair and a tanned back …'

Picture semantics straightforwardly captures the different concepts of mnemic accuracy as well as the challenges for authenticism: I have already pointed out in Section 3.2 that Greenberg's notions of 'situation' and 'target' [= viewpoint-centered situation]

[58] This weakening of accuracy-conditions is a common practice that is adopted, e.g. by Bernecker (2010), Perrin and McCarroll (2024), and Werning (2020).

(see Sect. 2.2) correspond to the notions of '(objective) past episode' and '(subjective object of the) past experience (of this episode)' in theories of episodic memory (see Fig. 5 [scenario/picture parallelism]). As a result, alethism and radical authenticism can be understood in terms of 'being true of the *situation*' and 'being true of the (Greenbergian) *target*', respectively. Classical authenticism can then be understood in terms of 'being true of the situation *and* the target'.

Importantly, the picture-semantic rendering of authenticism suggests a second line of argument against classical authenticism.[59] This argument exploits the requirement of a simultaneous inclusion by – and hence, truth of – episode content (EC) and experience content (ExpC). This requirement is questioned by the possibility that EC and ExpC may contradict one another. This happens in cases in which the agent perceived the original episode (or one of its inhabitants, or its properties) differently from what this episode/its inhabitant was actually like: Assume (in line with Fig. 3d ['swimmer from above'] and (8b)) that a man is swimming [objective episode] (see (34a)), but that – for reasons of low visibility, poor eyesight, or strong convictions – the agent (thinks he) sees a non-human mammal swimming [subjective episode] (see (34b)). While EC then includes the proposition 'A (hu-)man is swimming', ExpC includes this proposition's negation. Even if the mnemic content was exactly the subjective episode content (i.e. (34b)), the agent's memory could not be judged 'accurate' (at least not on a classical authenticist understanding of accuracy).

(34) a. $\left\{ s : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v} = \mathbf{T} \right\}$ = 'A young man swims in a body of blue water. His left arm is stretched out; he has short brown hair and a tanned back …'

b. $\left\{ s : \exists v. \left[\!\!\left[\text{  } \right]\!\!\right]^{s,v} = \mathbf{T} \right\}$ = 'A non-human mammal swims in a body of blue water. It is spotty brown-grey; its left flipper is pointing forwards …'

One could try to avoid such cases by relaxing authenticity-conditions. The resulting account would either drop the reference to both or – perhaps more plausibly – to either a young man (EC) or a non-human mammal (ExpC). However, on the second option, it is not clear which criteria decide whether we drop the inflicting part of experience content or of objective episode content.

6.2 The challenge from non-veridical experiences

I have already pointed out in Section 5.2 that memories from non-veridical experiences pose a challenge for contemporary theories of episodic memory. This challenge also extends to the concept of mnemic accuracy. Take the case of dream memories: Since, in dreaming, "the subject experiences, but he does not experience an event" (Michaelian, 2024b, p. 162), "there is no originally experienced [objective] event with respect to which the accuracy of the dream memory might be assessed" (*ibid.*, pp. 163–164; see also my Sect. 5.2). As a result, accuracy in memories from dreams cannot be construed as truth. Since Michaelian assumes that dream memories can display a shifted perspective (see Sect. 4.3 – such that his argument from observer memories equally applies to

[59] For reasons that will become clear below, this argument does not apply to radical authenticism.

dream memories –, it seems that accuracy in memories from dreams can also not be construed as (radical or classical) authenticity. (I will take issue with Michaelian's argument against the former variant of authenticity in the next subsection.)

To answer the challenge from the accuracy of dream memories, Michaelian (2024b) has proposed a competitor account to authenticism and alethism, viz. pisticism (from Greek 'pistis' [faith]). Pisticism characterizes accuracy in memory as faithfulness relative to the intentional object of the agent's original experience. To get this characterization off the ground, Michaelian extends the familiar candidates for the intuitive target of a mnemic representation (i.e. the (objective) past episode and the (subjective) object of its experience) by another candidate, i.e. the intentional objects of the agent's experience. Intentional objects are possible existents that are, in the oneiric case, "dreamt events" (p. 170, Fig. 7.1) or "[what] a dream [...] is about" (Michaelian, 2024b, p. 168). According to a strict version of pisticism, a memory is then accurate if its representational content is true of the intentional object of the agent's original past experience. The strict pisticist requirement on mnemic content inclusion is given below. There, 'IC' stands for the intentional object's content.

Strict pisticism. A memory is accurate if it only includes content that is true of the intentional object of the agent's past experience. ➥ MC $\subseteq$ IC

To capture constructive memory phenomena, pisticism is relaxed to only require that the mnemic content *mostly* includes the original intentional content:

Pisticism (Michaelian, 2024b)**.** A memory is accurate if it mostly includes content that is true of the intentional object of the agent's past experience. ➥ MC $\wr$ IC

Once such relaxation is in place, pisticism provides a generalization of actualist versions of alethism and of (radical or classical) authenticism (see Table 4; based on observations from Michaelian, 2024b).

Table 4: Case-distinction between authenticism, alethism, and pisticism

	AUTHENTIC	TRUE	FAITHFUL
Field memories from (field) veridical perception:	✓	✓	✓
Observer memories from (field) veridical perception:	✗	✓	✓
Field memories from (field) dreams:	✗	✗	✓
Observer memories from (field) dreams:	✗	✗	✓

I have already expressed my criticism of Michaelian's intentional objects in Section 5.3. Importantly, intentional objects face yet another challenge that is (more-or-less) independent of ontologies worries. This challenge concerns Michaelian's description of the intentional objects of dreams as the "dreamt events" (p. 170, Fig. 7.1): It is unclear what these objects could be if not the perspectival objects of a dreaming experience, i.e. a 'subjective (past) episode' (see Sect. 3.2)[60] – after all, they lack clear identity-condi-

[60]The identification of intentional objects with perspectival objects is also – though perhaps coincidentally – in line with Goodman's (1969) faithfulness-based account of accuracy in pictures. Thus, Goodman writes, "[...] for a picture to be faithful is simply for the object represented to have the properties that the picture [...] ascribes to it" (p. 38).

tions and are not (straightforwardly) shareable (*pace* instances of intentional identity like Geach's (1967) Hob-Nob case).

Interestingly, the difficulty concerning shareability also holds for the subjective targets of veridical experiences like visual perception: Unless I take exactly your position in space and time (which is impossible because you already occupy this position) and unless we happen to have exactly the same physiological and cognitive peculiarities (assume that, unlike you, I am color-blind), we do not perceive – and hence, cannot share – the same perspectival episode. The difficulty of sharing intentional objects-*qua*-perspectival episodes also shows why these objects cannot be identified with the objective episode (i.e. the 'normative event') in the case of memories from veridical experiences (*contra* what is assumed in Michaelian, 2024b).[61]

Obviously, if – as I have argued above –, Michaelian's intentional objects are just the perspectival objects of the agent's original experience, pisticism would face the same challenges from observer memories as authenticism (see my illustration in (33)). However, given Michaelian's (2024b) exclusion of alethism, authenticism looks like the only available option. It seems then that, to account for accuracy in memories for dreams, one must adopt a revised version of radical authenticism that does not presuppose an experienced (objective) episode. For lack of a better name, I call this version 'pure authenticism'. According to pure authenticism, a dream memory is accurate if its representational content is true of the subjective (object of the agent's) past experience:

Strict pure authenticism. A memory is accurate if it only includes content that is true of the agent's (subjective) past experience. ➥ MC $\subseteq$ bare ExpC

Pure authenticism. A memory is accurate if it mostly includes content that is true of the agent's (subjective) past experience. ➥ MC $\lozenge$ bare ExpC

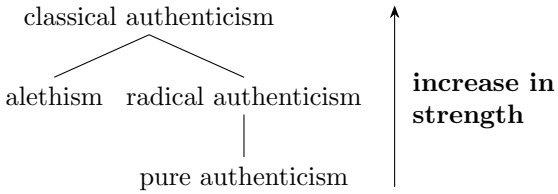
To account for observer dream memories, I will intermittently assume that these memories are explained as a particular instance of constructive memory phenomena (and can, hence, be accommodated by relaxing pure authenticist accuracy-conditions; *pace* my earlier argument from systematicity). I will provide a better account of observer dream memories in Section 6.3.

My previous characterization of alethism and of the different variants of authenticism suggests a strength-related ordering on the different concepts of mnemic accuracy: Since classical authenticism demands the mnemic inclusion of both objective episode content and past experience content, it places stronger accuracy-conditions on episodic memory than either radical authenticism (which only demands the by-and-large inclusion of the past episode content) or alethism (which only demands the by-and-large inclusion of objective episode content). Since only radical – but not pure – authenticism presupposes the existence of an objective past episode (whose subjective perspectival rendering they require to be included in the mnemic content), radical authenticism

[61] In particular, Michaelian (2024b) argues, "The key point to note about perception memory is that faithfulness and truth cannot come apart: since the intentional object (the object with respect to which faithfulness is assessed) just is the normative object (the object with respect to which truth is assessed), the memory will be true just in case it is faithful" (pp. 170–171).

places stronger accuracy-conditions on memory than pure authenticism. The strength of the different concepts of mnemic accuracy is captured in Figure 10.[62]

Figure 10: Different (non-strict) concepts of mnemic accuracy



6.3 The challenge from varying standards

The above suggests that memories from different kinds of experiences are subject to differently strong accuracy-conditions, which are grounded in different (objective or subjective) objects. In particular, while the accuracy of memories from non-veridical experiences like dreams only requires that the agent's mnemic content is true of the *subjective* object of the agent's original past experience (along the lines of pure authenticism), the accuracy of memories from veridical experiences like visual perception requires that mnemic content is true of the *objective* past episode (along the lines of alethism). In high-stake contexts like witness testimony in the courtroom, accuracy may even require that mnemic content is true of the agent's subjective past experience of this episode (along the lines of radical or classical authenticism).

That mnemic accuracy would depend on the situational context and the veridicality properties of the original experience goes against Michaelian's (2024b) assumption that a single concept of accuracy (in his case: faithfulness) would uniformly apply to all instances of episodic remembering. The opposite – and similar to what I have claimed above – has been argued by Perrin and McCarroll (2024). Perrin and McCarroll reason that, since experience- and event-related components of a past personal episode can hold as accuracy conditions, mnemic context-sensitivity goes beyond a variation of the level of accuracy (between strict, i.e. $\subseteq$-demanding, and non-strict, i.e. $\between$-demanding, versions): Any potential variation in the degree of accuracy can also vary event- and/or experience-related components (Perrin and McCarroll, 2024, p. 26). Perrin and McCarroll dub their view 'moderate authenticism' (or 'veridicalism'). In particular, this view holds that "accuracy conditions are sometimes [= in some contexts] authenticity conditions" (p. 6). More specifically, it requires that the memory's representational content is true of the (objective) past episode (as demanded by alethism). Depending on context, it may *additionally* require that this content is true of the agent's (subjective) original past experience of this episode:

[62]This strength-ordering holds for 'constructivity-friendly' versions of these concepts (that require a by-and-large inclusion of content, $\between$), as well as for their strict counterparts (that require a full inclusion of content, $\subseteq$).

Moderate authenticism (Perrin and McCarroll, 2024)**.** A memory is accurate if it mostly includes content that is true of the past episode and – in some contexts – if it is further true of the agent's experience of it. ➥ MC ◊ EC [& MC ⊆ ExpC]

I will show below that, when combined with plausible assumptions about the availability of 'originally experienced objective events', the tools from picture semantics can identify modular accuracy classes (with differently strict requirements on accuracy) that capture the intuitions from the beginning of this subsection. Relevant tools include the distinction between *situation* and *target*, i.e. a perspectival [= (mode- and) viewpoint-centered] situation. They further include the assumption that a representation can be of a target even if the underlying situation is not independently available (along the lines discussed for pisticism and pure authenticism in Sect. 6.2).

The distinction between situations, targets, and targets plus situations allows us to identify three different requirements on content inclusion (dubbed 'strict', 'objective', and 'lax') that capture the accuracy-conditions of strict pure authenticism, of non-strict alethism, and of very weak cases of authenticism, respectively. In the specification of these classes, σ is a mnemic scenario (Greenberg's 'picture'). e_{OBJ} and e_{SUBJ} are the episode itself and, respectively, the perspectival object of the agent's past experience of this episode (as explained in Sect. 3.2 and captured in Fig. 5). $[\![\cdot]\!]$ is a content function (introduced in Sect. 2.3) that identifies a representation's propositional information.

(S) Strict accuracy. A memory of an episode e is strictly accurate if the mnemic scenario σ does not include any non-e_{SUBJ} information. ➥ $[\![\sigma]\!] \subseteq [\![e_{\text{SUBJ}}]\!]$

(O) Objective accuracy. A memory of an episode e is objectively (moderately) accurate if σ includes at most *some* non-e_{OBJ} information, where the threshold for '*some*' is contextually defined ➥ $[\![\sigma]\!] \lozenge [\![e_{\text{OBJ}}]\!]$

(L) Lax accuracy. A memory of an episode e is laxly accurate if σ includes at least one salient, contextually non-trivial item of information (or proposition, p) that is true of e_{SUBJ}. ➥ $\exists p.\, p \neq \emptyset \;\&\; p \in \left([\![\sigma]\!] \cap [\![e_{\text{SUBJ}}]\!]\right)$

I will show below that, since (S), (O), and (L) exhaust different conceivable cases of mnemic (in-)accuracy, they do not need to be supplemented by any of the previously-discussed requirements.

My definitions of (S) and (L) entail that any memory that is strictly accurate will also be laxly accurate. My definitions of (S) and (O) entail that any memory of an experience of an independently given episode (i.e. any memory of a veridical experience) is strictly accurate only if it is objectively accurate. Importantly, however, the entailment from (S) to (O) does not generalize. In particular, since, in dreaming, the agent "experiences, but he does not experience an event" (Michaelian, 2024b, p. 162; see my elaborations in Sect. 6.2), memories from dreams violate (O)'s presupposition[63] that "there is ... [an] originally experienced [objective] event with respect to which the accuracy of the dream memory might be assessed" (Michaelian, 2024b, p. 161). As a result, dream memories can never be objectively accurate. Because of the counterfactuality of hallucination – and the attendant significant difference between e_{SUBJ} and e_{OBJ} –, the same holds for cases of hallucination.

[63] This presupposition is part of the requirement that σ "includes at most *some* non-e_{OBJ} information".

The above gives rise to four different accuracy classes (labelled 'A'–'D' in Table 5), where 'A' and 'B' stand for 'strict' and 'quasi-strict' accuracy, respectively. 'C' stands for 'moderate accuracy'; 'D' for 'weak accuracy'. As the table shows, strictly and quasi-strictly accurate memories are memories that satisfy the requirement from (S) (and, hence, from (L)), where strictly accurate memories differ from quasi-strictly accurate memories by additionally satisfying (O). Moderately accurate memories satisfy the requirements from (O) and (L). Weakly accurate memories only satisfy (L). In line with my previous considerations – and as suggested by Perrin and McCarroll (2024) –, the different accuracy classes thus differ both with (i) the parameter (i.e. e_{OBJ} (O) vs. e_{SUBJ} [(S), (L)]) with respect to which accuracy is defined and with (ii) the amount of novel mnemic content that is considered admissible (i.e. none (S), some (O), and much (L)).

In Table 5, 'VP' abbreviates 'veridical perception'. To show that the different accuracy classes are sensitive to the amount of constructed novel content, I distinguish between mildly and grossly inexact memories from veridical perception. Since inexact memories from non-veridical experiences by definition fail to meet both (S) and (O) (s.t. they are immediately classified as 'weakly accurate' [D]), this distinction is not relevant – and is, thus, omitted – for memories from dreams.

Table 5: Case-distinction between strict, objective, and weak accuracy

		S(TRICT)	O(BJECT'E)	L(AX)
A.	Exact (possibly partial) field memories from (field) VPs:	✓	✓	✓
B.	Exact (possibly partial) field memories from (field) dreams:	✓	✗	✓
C.	{Exact, mildly inexact} observer memories from (field) VPs:	✗	✓	✓
	Mildly inexact field memories from (field) VPs:	✗	✓	✓
D.	{Observer, inexact field} memories from (field) dreams:	✗	✗	✓
	Grossly inexact {field, observer} memories from (field) VPs:	✗	✗	✓

For the Rubik's cube example from Section 2.2, the different accuracy classes are illustrated in Table 6. This illustration assumes that, at the relevant past point in time, the agent experienced the subjective perspectival object in Figure 11. The latter is the representation of a particular (independently given) Rubik's cube.

Figure 11: The field perspectival object of the agent's experience (based on Fig. 2)

The different Rubik's cubes in Table 6 are different mnemic representations of the perspectival object, e_{SUBJ}, from Figure 11. Of these representations, the leftmost one (with mostly the white side facing front) is an exact, but partial representation of e_{SUBJ} (the sticker on the middle square is missing). The middle representation (with only the green side facing front) is a partial, mildly inexact, different-perspective representation of e_{SUBJ} (the cube has been rotated, the shade of green is a bit lighter than originally

perceived). The representation on the right is a grossly inexact representation of e_{SUBJ} (the cube's parts have been moved, its color drastically changed).

Table 6: Accuracy classes: illustration (two cases)

Case i: the agent's experience was veridical

				
A.	strict:	✓	✗	✗
B.	quasi-strict:	–	–	–
C.	moderate:		✓	✗
D.	weak:			✓

Case ii: agent's experience was non-veridical

				
A.	strict:	–	–	–
B.	quasi-strict:	✓	✗	✗
C.	moderate:		✗	✗
D.	weak:		✓	✓

The example from Table 6 shows that the veridicality properties of the original experience influence the accuracy-classification of its representation – even if the veridical experience and its non-veridical counterpart were to have exactly the same representational properties. Thus, the middle representation in Table 6 (with the lighter shade of green) is classified as 'moderately accurate' if the original experience is veridical (see the left table), but as 'not moderately accurate' if the original experience is non-veridical (see the right table). While this might initially seem counterintuitive, a more careful deliberation reveals the likely sources of such non-uniform classification: These sources lie in the observation that, only in the case of memories from veridical perception – but not necessarily in the case of memories from dreams –, there is a fact of the matter (viz. an objective episode) relative to which the shifted perspectival representation can be obtained. Since the agent has, in all likelihood, experienced this episode or its salient participants (incl. himself) from more than one (visual or other) perspective (e.g. when looking in the mirror or at photos of himself), his simulation of an observer perspective should not require much effort.

The above differs from the case of dream memories: I have already pointed out that 'dreamt events' typically lack an objective episode of which these events are perspectival representations. The absence of such episode excludes the presence of multiple perspectives during encoding (see McCarroll, 2018), leaving only two options: (i) the availability of perspectival information from other, *veridical* experiences of the events' salient inhabitants (analogously to the case of observer memories from veridical experiences) or (ii) the supplementation of this information from other (semantic or episodic) sources. Admittedly, option (i) is only feasible in cases in which the dreamt event features real-world individuals or objects with whom the agent is personally acquainted (thus affording the needed perspective). Such cases warrant Michaelian's (2024b) assumption that "just as one can have a field perspective perceptual experience and later have an observer perspective memory of the perceived event, one can have a field perspective dream and later have an observer perspective memory of the dreamt event" (p. 166).

In cases in which the episode does not contain such familiar objects, option (ii) provides the only means of obtaining an observer- (or more generally: shifted-) perspective episodic simulation. Expectedly, since there is no objective fact of the matter that these

cases (are intended to) represent – and since they leave the systematicity of the novel content unexplained (analogously to 'constructive' variants of authenticity; see Sect. 6.1) –, these cases are at best weakly accurate. The absence of an independently available objective episode in dream memories supports the intuition (reported, but not endorsed, in Michaelian, 2024b) that "[while] successful remembering, in general, does not require authenticity, successful dream remembering, in particular, does require authenticity" (p. 166).

This completes my discussion of the varying standards of mnemic accuracy. I close this paper by suggesting how the picture-semantic framework could be extended to the level of metarepresentation.

7 An inverse application

My presentation so far has assumed that picture semantics is structurally strictly richer than contemporary accounts of episodic memory, making distinctions that can help answer some current issues in philosophy of memory. The previous section has already suggested that this potential for application is not solely unidirectional. Thus, in contrast to picture semantics (which assumes a single, uniform view of accuracy; essentially: strict radical authenticism), philosophy of memory has proposed a host of competing views of accuracy, including different versions of alethism, authenticism, and pisticism. I will leave a picture-semantic 'translation' of these views as a project for future work – convinced that such translation will prove immensely useful for understanding accuracy of pictorial representations. Here, I want to focus on another inverse application, viz. the distinction between representation and metarepresentation.[64]

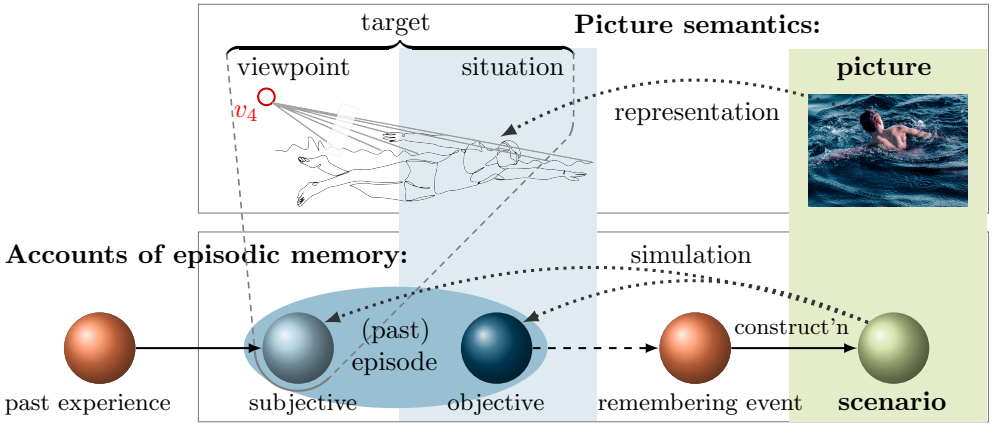
My discussion of the parallelism between mnemic scenarios and pictures (in Sect. 3.2, see Fig. 5, copied as Fig. 12) has already suggested that – in contrast to contemporary accounts of episodic memory – picture semantics neglects the representational attitude[65] itself (i.e. depiction). This is also true of the metarepresentational properties that are relevant to this attitude: In the top [= 'picture semantic']-part of Figure 12, the experiences that are central to episodic remembering lack a picture-semantic counterpart. This holds both for the matrix attitude (see the orange node labelled 'remembering event') and for the original experience (e.g. visual perception, proprioception, dreaming) that supplies the referents of this attitude (see the orange node labelled 'past experience'). Importantly though, these two kinds of experience are both also highly relevant to pictorial representation. This obviously holds for the depictive attitude (e.g. painting, drawing, skulpting) itself, without which the pictorial representation would never have come about, and whose properties (e.g. art form [painting vs. sketching vs. ...]; depiction style) influence the representational properties (see Sect. 2.1).

Perhaps surprisingly, the original – actual or counterfactual – experience (in the case of a life drawing: veridical visual perception) takes an at least equally salient role

[64] Thanks to André Sant'Anna for pushing me on this point.

[65] Arguably, calling painting an 'attitude' sounds somewhat artificial. Nonetheless, for the present purposes, I will stick to this terminology to emphasize the representational view of depiction that is relevant here (see also Sect. 2.1). On this view, in depicting, the artist yields a (paradigmatically visual) representation of a (depicted) target object or event (Greenberg, 2018, 2021; see also Zimmermann, 2016). Since it relates an agent to a representation, depiction – thus-understood – shares the core properties (e.g. aboutness, accuracy) of more typical representational attitudes like believing, wanting, or imagining.

Figure 12: Parallelism between scenarios and pictures (meta)



in picture semantics. After all, it is this experience that provides the depicted individual or situation. One might argue that this experience is implicit in Greenberg's notion of 'perspective' or 'viewpoint' (see my analysis of perspective as projection source plus mode, in Sect. 3.1). However, if one generalizes the notion of viewpoint across modes (as is required to capture different, incl. non-visual, art forms), the relevant information gets lost. It will be interesting to see what effect an explicit incorporation of the original experience will have on the empirical scope and modelling power of picture semantics.

I will end this section by supporting the explicit introduction of the matrix attitude (e.g. remembering or depicting) in the model from Figure 12. This support comes from at least three sources: (i) the differentiation between pictures, mnemic and other attitudinal scenarios, (ii) the need to account for *de se*-representational content, and (iii) the need to explain the one-to-many relation between pictures/scenarios and original experiences, and *vice versa*: A one-to-many relation holds in non-singular memories (see Andonovski, 2020); a many-to-one relation holds in cases of re-remembering (see Perrin, 2024). For reasons of space and relevance, I here focus on (i) and (ii):

(i) My picture-to-scenario transfer from Section 3.2 was intended to show that there is, in principle, no qualitative (i.e. phenomenological) difference between pictorial and mnemic representations. While this is in many ways unproblematic or even desirable (consider the neural commonalities between remembering and imagining; see e.g. Addis et al., 2007), knowing whether a representation is produced by a reliable or unreliable episodic construction system – with stricter or weaker constraints on accuracy – (see Michaelian, 2016b, 2021) is an important part of our epistemic housekeeping. Incorporating a level of metarepresentation into the framework from Figure 12 – and hence, explicitly representing mnemicity (or being the product of some other attitude/mental state; Mahr, 2024; Perrin and Sant'Anna, 2022; Redshaw, 2014) – allows us to perform such housekeeping.

(ii) The explicit representation of the matrix attitude is further supported by the need to identify the self in *de se*-memories: I have already argued in Section 4.4 that mnemic contents can involve the rememberer's self. This is the case, e.g., in Sant'An-

na's (2018) 'eating lasagna'-memory, which is, in an essential sense, about Sant'Anna. To capture the self-directedness of the content of this memory, I have proposed to analyze this content as a property (here: eating a particular piece of lasagna with specific perceptual features in a certain, well-defined environment). However, unless we attribute this property to the rememberer (here: Sant'Anna), we will not be able to identify the individual that provides the *de se*-center of this content. By explicitly representing attitudes like remembering or depicting – and, with them, the *bearers* (or 'subjects') of these attitudes –, we make such identification possible. In picture semantics, this identification is needed to describe the representational content of self-portraits (see the penultimate paragraph in Sect. 3.2).

8 Conclusion

This paper has started from the observation that there is a striking conceptual parallel between contemporary accounts of episodic memory (e.g. Addis, De Brigard, Michaelian) and picture semantics (Greenberg, Abusch, Maier). It has argued that, while picture semantics captures all familiar distinctions from philosophy of memory,[66] it provides some extra – highly useful – tools and concepts. The bulk of the paper has been concerned with showing that these tools/concepts help (re-)structure and advance debate in contemporary philosophy of memory. This holds for picture semantics' mechanism for representation-to-content conversion (which enables a strong defense of mnemic propositionalism; see Sect. 4), for a possibilistic notion of situation (which affords an account of dream memory objects; see Sect. 5), and for the distinction between situations and targets (which provides a principled justification of pluralism about accuracy concepts and standards; see Sect. 6).

Beyond the above, the different applications also directly contribute to other ongoing work in the philosophy of memory. In particular, Section 3.3 defends a liberal version of the pictorial view of mnemic imagery. Section 4.4 provides a new argument for the compatibility of mnemic propositionalism with *de se*-content. Section 6.2 gives an ontological worry-free analysis of pisticism's 'intentional objects' and reveals faithfulness about accuracy as a weak variant of radical authenticism. Section 6.3 explains different intuitions about the possibility of observer-perspective memories from dreams.

Arguably, given its substantial length, the paper might have been more prolifically split into three shorter papers (viz. on mnemic propositionalism, on non-actual memory objects, and on accuracy). My main reason against this move is the following: Only by illustrating that a *single* fairly simple framework, viz. picture semantics, accounts for a whole range of issues in philosophy of memory (incl. truth, reference, and accuracy) can we show the impressive explanatory power of this framework.

Expectedly, the examples from this paper do not exhaust the space of mnemic applications of picture semantics. In particular, if this framework can account for non-particular memory objects (as I have shown in Sect. 5.3), one may expect that it can also account for the (generic) objects of non-singular memories (Andonovski, 2020). Similarly, if this framework can explain reference in episodic memories (as I have shown in Sect. 5.2), it will likely also be able to explain reference in other cases of constructive

[66] This holds at least for the representational object-level, as I have shown in the previous section.

episodic simulation, like referential imagination (Liefke and Werning, 2024) and referential confabulation (Openshaw and Michaelian, 2024). I leave the picture-semantic treatment of these and other topics as a project for future work.

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