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SUCCESS ATOMISM: THE ACCURACY OF EPISODIC MEMORY AND ITS RELEVANT ELEMENTS

José Carlos Camillo

Abstract

There are two competing and sometimes neglected assumptions in the philosophical discussion on the success and accuracy of episodic memory. In this paper, I articulate them and argue for one of them. Most philosophers assume that the success of a mnemic representation should be assessed holistically, with all of its elements having equal weight in the success of the memory. Some philosophers, in contrast, assume that the success of a mnemic representation depends on specific relevant elements. I defend the latter assumption using the paradigmatic case of inquiries. I argue that social norms regarding memory prioritizes the accuracy of certain elements in inquiry contexts. In these contexts, the inquiry selects which elements are relevant to the success of episodic memory.

Keywords: Episodic Memory; accuracy; inquiry; social norms; Rational Analysis; inquisitive semantics.

[...] good remembering consists in our ability
to recall what is significant in the context of
our recollections.
Campbell (2006, p. 367)

1 Introduction

In the debate over the success and accuracy of episodic memory (hereafter referred to as the *accuracy debate*), philosophers have adopted two competing assumptions. Most commonly, philosophers assume that the mnemic content is assessed holistically, meaning that all elements in the mnemic content are equally considered when evaluating accuracy. Less frequently, some philosophers adopt an atomic approach, where only specific elements of the mnemic content are evaluated for accuracy. This paper presents and discusses these assumptions, arguing in favor of the latter. However, two preliminary clarifications are necessary.

Firstly, I define episodic memory (hereafter referred to as *memory*) as a system responsible for producing detailed representations of specific events from one's personal past (Hassabis & Maguire, 2009; Cheng & Werning, 2016; Lu et al., 2022; Brown, 2024; see Andonovski, 2020, 2023, for alternative views on episodic memory). The content of these representations is referred to as a *scene*, which is an informationally rich depiction of these events. Secondly, both assumptions agree that accuracy is a necessary condition for memory success. However, accuracy alone is not sufficient; some views also require an appropriate causal link to the remembered event (Bernecker, 2010; Robins, 2020; Werning, 2020), while others require that the memory be produced by a properly functioning cognitive system (Michaelian, 2016, 2022, 2024; Addis, 2020). Although these conditions are sometimes considered as genuineness conditions, they are also necessary for memory success. Moreover, there are other success conditions that are not related to accuracy. For instance, Fernández (2015) defended that memories can be successful even if they are inaccurate when they fulfill other functions of memory (cf. Bluck et al., 2019). My focus in this paper, however, will be exclusively on the success of memory to the extent that it depends on accuracy and on accuracy to the extent that it contributes to the success of memory. In other words, my contribution will be limited to what I have called the accuracy debate, and not to the success debate in general.

Although both assumptions are present in the accuracy debate, it is notable that philosophers of memory, with few exceptions, have not devoted significant attention to defending either position. Consequently, the holistic view may dominate simply due to neglect or lack of awareness of the alternative atomistic view. For this reason, I begin by clarifying these assumptions (Section 2). I then argue that social norms favor the atomistic view (Section 3). Following this, I propose a preliminary model for assessing the accuracy of mnemic content under the atomistic view (Section 4). After that, I will address an important objection to this project, which is related to the motivation to discuss social norms when investigating the success conditions of memory (Section 5). Finally, I discuss the implications of my argument for the current accuracy debate and address potential objections (Section 6).

2 Introducing Success Holism and Success Atomism

In this section, I outline the two competing assumptions within the current accuracy debate. Consider the following scenario: I now recall giving a talk at a philosophy conference. My memory includes various elements such as the slides I presented, the session chair, the attendees, and the furniture of the room. Suppose the only misrepresented element in this memory is the session chair; in reality, Kristina chaired the session, but in my memory, I recall Sarah as the chair. Typically, philosophers of memory would consider this memory successful because it is assumed that a memory is successful when it is overall accurate. Since the content of a memory is understood as a *scene* (Hassabis & Maguire, 2009; Rubin & Umanath, 2015; Rubin et al., 2019; Liefke, 2023, 2024), the scene as a whole must be accurate over a degree/threshold for the memory to be deemed successful.[1]

[1] I will not consider in this paper views according to which memory, to be successful, should be perfectly accurate because philosophers long ago have rejected this view (see Bernecker, 2010, Michalien, 2011).

This perspective, which I term *Success Holism* (SH), asserts that the success of a memory depends on the accuracy of the scene as a whole.[2] In this context, "elements" refer to the discrete units that make up the mnemic content—typically understood as the objects or individuals and their attributes that constitute the scene *qua* mnemic content (Green & Quilty-Dunn, 2021; Võ, 2022). Even though it is not unanimous that the mnemic representation *represents* holistically, for different reasons, philosophers who assume SH consider that the success of memory is *assessed* holistically.

One advocate of SH is Bernecker (2010, 2017), who argues that the content of a particular memory should be mostly accurate to be successful. He further elaborates that this accuracy can be assessed either by counting the "absolute number of errors" or by examining the proportion of correct and incorrect elements (Bernecker, 2017, p. 55). In either case, the totality of elements within the representation is considered. Another proponent of this assumption is Werning (2020, p. 307), who suggests that a memory is successful if the spatial, temporal, and qualitative properties of the scene are sufficiently similar, i.e., similar over a threshold, to the properties of the actual event it represents. Although both authors acknowledge that the threshold for verisimilitude may vary depending on context, they assert that all elements of the scene are equally considered in this evaluation.[3]

In summary, SH, as represented by these proponents, can be defined by the following two key statements.

[2] Success Holism and Success Atomism are not perfect labels, I admit. However, other labels such as Success Globalism and Success Localism would face similar concerns. For lack of a better name for these views, I call them as labeled above.

[3] Similarly to them, SH is assumed by most philosophers of memory even when not explicitly expressed (e.g. McCarroll, 2017, Robins, 2020, Michaelian, 2022, Michaelian & Sant'Anna, 2022, see also Section 5).

> SH: (a) the accuracy of the mnemic content is assessed holistically—meaning the scene as a whole is crucial when determining the success of the mnemic representation;
>
> (b) a memory is considered successful only if its content is accurate to a sufficient degree (a threshold).

Despite being the dominant view, the success of memory can intuitively be assessed using different parameters. Consider the earlier example where I mistakenly recall "Sarah" as the chair of my talk. When someone asks who the chair was, I would respond with "Sarah" based on my memory. If that person later discovers that the chair was actually Kristina, they might reasonably conclude that my memory has failed. Conversely, if most elements of a memory are inaccurate, but I correctly recall the specific element in question, there is a sense in which my memory succeeds, even though SH would classify it as a failure.[4] This intuition aligns with Schwartz's (2020, p. 490) recent observation that to determine the success of a mnemic representation

> […] it will matter very much whether the episodic representations deposited and retrieved are the same with respect to some features of content, it will matter very little whether they are the same with respect to other features of

[4] Some may have different interpretations of the above views. Both Bernecker and Werning give examples where the inaccuracy of just one element is sufficient to cause the whole representation to fail. Nevertheless, one should be careful, because most of the examples given in the literature are simplified, since the description of a whole scene is not an easy task (see Liefke, 2024). Even the examples presented in this paper are very simple, with a very limited number of elements (see Section 4). Therefore, one should avoid deriving an interpretation of their views based primarily on the examples they give. Instead, one should base the interpretation of their views mostly on where they explicitly present the accuracy or success conditions, as introduced above (Bernecker, 2017, p. 55, Werning, 2020, p. 307).

content, and the subject's epistemic context will be what makes the difference.

Similarly, Andonovski (2021) suggests that functional properties of memory systems are not sufficient to determine memory success and that pragmatic aspects of each context would be necessary to determine the success conditions of memory. In line with this argument, he suggests in passing that in many contexts only certain elements would be relevant to memory success.

I refer to views similar to those of Schwartz (2018, 2020) and Andonovski (2021) as *Success Atomism* (SA). While SA can agree with SH on the point that the success of memory is measured according to degrees of accuracy (b), it differs fundamentally in its approach to assessing accuracy, reformulating (a). Unlike SH, SA does not evaluate the accuracy of mnemic content holistically; instead, it focuses on specific elements—a subset of elements. As suggested in the earlier example, the subset of elements relevant for determining accuracy is context-dependent. Therefore, we can define SA as follows.

SA: (a_1) the accuracy of the mnemic content is assessed considering a specific context-determined subset of elements when determining the success of the mnemic representation.

(b) a memory is considered successful only if its content is accurate to a sufficient degree (a threshold).

It is important to note that although statements (a) and (a_1) are competing, (a_1) is not a direct negation of (a). This is because, in SA, the subset of elements relevant to accuracy is determined by the context. In some contexts, this subset might include all elements within the representation (see Section 5). In other words, if we denote the entire scene as S and the subset of relevant elements as s, SA should be understood as considering that $s \subseteq S$. In other words, SA is a weaker claim than SH, because there are contexts where all elements could be relevant to the success of memory according to SA. SH, by contrast, assumes that all elements are equally relevant in every context. In SH, the context influences only the threshold of accuracy for the overall representation (b).

In summary, SH and SA differ in their approaches to assessing the accuracy of mnemic content. SH always evaluates accuracy holistically, giving equal weight to each element of the content. In contrast, SA assigns different weights to elements, with the relevant subset for accuracy determined by the context. Both views agree, however, that a memory is successful only if its content is accurate over a degree/threshold. Therefore, the debate between SH and SA centers on the contrast between (a) and (a_1). In the next section, I will argue that social norms in contexts of inquiry favor SA, as the assessment of mnemic content typically considers a contextually determined subset of elements (a_1), as predicted by SA, rather than the holistic approach of SH. In Section 4, I will introduce a preliminary model to account for both (a_1) and (b). In Section 5, I will defend this invocation of social norms and argue that it is relevant to theorizing about the conditions for the success of memory.

3 Social normativity in inquiry cases

In this section, I argue that social norms support the Success Atomism (SA) perspective. Since accuracy is necessary for the success of memory, we can infer how accuracy is assessed—whether by a or a_1—based on what is considered a successful memory. In other words, if the success of mnemic content hinges on specific elements, we can confidently conclude that its accuracy is being assessed according to a_1 rather than a. Here, I will examine the social context of inquiry and the norms or requirements that determine when mnemic content is deemed successful in these contexts. It is important to emphasize that, as will become clear in this section, the normativity involving inquiry contexts is very common and has robust evidence in its favor. However, I do not intend to argue in this paper that this is the only social norm that regulates memory success. I only take inquiry as a paradigmatic case of social norms involving memory.

Social norms can be studied by analyzing social behaviors, especially those involving rewards and reprimands, as well as by examining written laws (Anderson & Dunning, 2014). However, written legislation often lacks the nuances of social normativity (Kelly et al, 2025). For this reason, I will focus on the behavioral acquisition in children, where norms are clearly expressed through rewards and reprimands. Additionally, I will explore evidence showing that these norms are internalized and adhered to throughout one's life (Kelly, 2022). These norms are considered social because their adoption is facilitated by social interactions, in line with the literature on social learning (Fragaszy & Perry, 2003). This understanding of social norms does not imply that they are merely social constructs or that they develop solely in social contexts. Rather, it indicates that their adoption is facilitated by social interactions. In other words, while a cognitive agent might independently adopt these norms through rational inference alone or other methods, in humans, the adoption of these norms is primarily supported by social interactions.

A foundational study on memory exchanges comes from the work of Melissa Welch-Ross (1997). An interesting finding from her studies is that a significant amount of interactions regarding people's memories involves inquiries. Regarding adult-children interactions, when inquiries are properly answered, parents reinforce success by reiterating the correct answer, when they are not, corrections are made, which suggest normativity. Further support comes from the work of Robyn Fivush and colleagues (see Fivush, 2011). The following examples capture recorded interactions between a mother (M) and a child (C).

Example 1:

M: What other animals did we see at the circus?

C: A giraffe.

M: No, we didn't see a giraffe at the circus. Who did we see at the circus that looked funny? Remember the rhinoceros? […]

M: What else did we see at the circus?

C: Um, giraffe.

M: No, we didn't. […]

Example 2:

M: What did Mommy find for you that you brought home?

C: Rocks.

M: Yeah, we got some rocks, didn't we?

C: And fire hats.

M: And fire hats? Yeah, that's right! Those tiny little fire hats. I forgot about those. Where did you get those?

C: Grandma and Grandpa.

M: Grandma and Grandpa gave those to you.

(Fivush & Nelson, 2006, p. 239).

When a child answers an inquiry correctly, the mother reinforces the behavior with repetition (Example 2); conversely, an incorrect answer prompts immediate correction (Example 1). Reinforcement and corrections are seen as types of reward and reprimand, respectively (Anderson & Dunning, 2014, Westra & Andrews, 2022, Heyes, 2024). Therefore, the dynamics present in interactions like the above are indicative of a normativity where the success depends on providing proper answers that align with the mother's intention. That is, in these contexts, memory should contribute to providing proper answers to inquiries. Crucially, the satisfaction or not of this norm depends on specific elements with which the inquiries were concerned ("what animals did you see at the circus?). In other words, inquiries, such as those in the example, focus on specific elements. The success of remembering in those cases depends on these elements and, usually, do not consider other elements, which favors (a_1) and, consequently, SA. In support, cross-cultural studies, involving Western and Eastern participants show similar results, indicating the pervasiveness of this normativity (Wang, 2019, 2021).

One potential objection could be that the normativity hypothesized here only pertains to memory reports and not the mnemic representation itself. However, as the subsequent paragraphs will illustrate, the content of memory itself undergoes significant changes based on typical questions posed to children. This suggests that mnemic representations prioritize information relevant to answering those questions, indicating that this normativity governs not just memory reports but the functioning of the memory system as a whole. In other words, this social normativity is likely to shape or modulate the functioning of the memory system (see Section 5).

Interestingly, when children recognize that there is a form of normativity linking their memories to the questions posed to them, they begin to develop strategies for encoding and recalling information that they anticipate will be asked (Welch-Ross & Miller, 2000). This behavior supports the hypothesis that this normativity demands the accuracy of specific elements rather than the accuracy of the global representation. By focusing more attention on information they expect to be asked about, children intentionally enhance both the encoding and recall processes, thereby influencing the mnemic content itself, not merely the reports.

A similar phenomenon is observed in adults. In a recent study, some participants were informed beforehand that they would need to report specific details of their memories, while others were informed only at the recalling task. The results showed that participants who were informed beforehand produced reports that were significantly longer, more accurate, and contained more sensory references than those informed afterward (Barzykowski et al., 2023). Various explanations could account for this difference, but they all suggest some form of selective monitoring within the mnemic content itself, based on the anticipated task of answering specific inquiries. If normativity influenced only the reports, then the timing of the inquiry—whether asked before or after the encoding process—would not significantly impact the accuracy of the answer. Therefore, the findings from these studies suggest that the normativity associated with inquiries influences which elements are better encoded and retrieved, thus affecting the functioning of the memory system and the production of mnemic representations.

This normativity appears to be internalized by children, shaping how their memory develops to better recall information typically asked of them. For example, studies examining the relationship between gender and memory development consistently show that girls are often encouraged to discuss their feelings and the causal relations of past experiences, while boys are typically asked about their past achievements. Consequently, when teenagers and young adults are prompted to recall past experiences, females tend to better remember their past feelings and the causal relations of events compared to male respondents (Fivush, 2019). Given that memory systems seem to rely on schemas to reconstruct past episodes (Ghosh & Gilboa, 2014; Baddeley et al., 2020; Addis, 2020), the frequent inquiries made to girls and boys contribute to the formation of gendered schema-types that each gender uses to remember aspects of events related to the questions they are commonly asked (Welch-Ross & Schmidt, 1996).

Unsurprisingly, several studies have shown that generating and answering questions is a powerful mnemonic technique, often yielding results comparable to—or even surpassing—other established memory strategies. Similar findings have been reported in studies involving actors learning their lines (Noice, 1996) and students preparing for written exams (Noice et al., 1999). These results suggest that simply intending to remember something and paying attention to it is less effective than engaging with the material through question-making and answering. If the hypothesis presented here is correct, social normativity modulates memory functioning by prioritizing the encoding and retrieval of information that supports accurate responses to questions.

According to the mentioned evidence, this prioritization exceeds the effects of intention and attention alone, both of which are known to influence memory performance.

One possible objection is that the improvements in encoding and retrieval are not due to normativity, but rather to the depth of processing involved. Indeed, many studies have shown that deeper levels of processing during encoding are associated with better retrieval outcomes (Schacter, 2021). In this view, the mnemic benefits of generating and answering questions would stem from the complexity of the cognitive processes it entails. However, this objection is arguably mistaken. The question-making technique has been shown to outperform other deep-level processing strategies, such as integrating pieces of information into coherent narratives (Noice & Noice, 1997; Schacter, 2021). Moreover, while narrative-based methods typically involve connecting multiple elements into a single structure—arguably requiring a deeper level of processing—the question-making technique often focuses on individual elements. This suggests that its mnemic advantage cannot be fully explained by processing depth alone (Schacter, 2021).

All of this suggests that mnemic content is both intentionally and automatically shaped to provide proper answers to inquiries. The intentional aspect is evident when individuals focus on specific elements they anticipate will be required of them later, facilitating the storage and retrieval of these elements. Additionally, this process may operate automatically, with memory systems more accurately storing elements that will produce proper answers to frequently asked inquiries or to prioritize information that will support proper answers to questions over other factors that also modulate memory functioning, including intention, attention, and processing depth. When individuals fail to provide a proper answer, it is common for others to view their mnemic capacities—not just their specific memory reports—as unsuccessful (Campbell, 2003). Some individuals even begin to distrust their own memories when others frequently challenge the accuracy of the memory reports they were asked to give (Fivush, 2019). In other words, the fulfillment of this normativity is expected of the memory system itself, not just the reports it generates.

From the discussion above, we can derive some norms regarding the success of memory, as suggested by the social psychology studies.

i) To be successful, memory should support proper answers to inquiries.

ii) To support proper answers to inquiries, memory should ensure the accuracy of the specific relevant elements determined by the inquiry.

It is important to note that some of the studies discussed involve researchers formulating questions for participants, which might suggest that memory is evaluated based on these questions due to the experimental design. This could imply that the normativity related to settling inquiries is merely an artifact of the research setup. However, many of these studies use more naturalistic or ecological methods, such as recording ordinary conversations, reducing the likelihood of forming such artifacts. Furthermore, research examining how memory develops over time looks at systematic interactions in real-life situations, making it less likely that the interference of scientists is a significant factor. Finally, by comparing question-making mnemonic technique with other mnemonic techniques, researchers could notice that the prioritization of information that will support proper answers is not an artifact of their experiment designs. This suggests that the hypothesis that *memory is successful when it aids in properly answering inquiries about one's personal past* is not simply an artifact.

This hypothesis is further supported by the Rational Analysis of Memory. According to this model, cognitive systems operate based on the principle of rationality, which aims to "optimize the adaptation of the organism" (Anderson, 1990, p. 28). In other words, cognitive systems strive to maximize benefits and minimize costs for the organism (Schooler & Anderson, 2017). Specifically, Rational Analysis posits that memory systems respond to informational demands from the environment (Stevens et al., 2013), similar to what happens in inquiry contexts. To meet the principle of rationality, memory systems follow the principle of need probability, by which both encoding and retrieval depend on the likelihood that an item will be needed in the future and in the current situation, respectively. Thus, the relevance of an item is based on its anticipated future need.

Need probability influences both encoding and retrieval, considering a history factor—how often and recently an element was relevant—and a context factor—how likely an element is to be relevant in the current context, regardless of its past relevance. Here, context is defined by associations between elements/items in past events and their likely association in the current situation (Anderson, 1990, Chater & Oaksford, 1999; Schooler & Anderson, 2017, Gershman, 2024).

The Rational Analysis of Memory is well-supported by evidence. Its predictions align with human performance across various experiments, suggesting that human memory adheres to similar principles (Schooler & Anderson, 2017). Additionally, the effects of frequency, recency, and associative strength are well-documented in memory research (Baddeley et al., 2020), consistent with the Rational Analysis model, particularly the context factor (DuBrow et al., 2017). Finally, evidence shows that hippocampal cells operate according to the principles of rationality and need probability proposed by Rational Analysis, and the hippocampus is crucial for many memory processes (Gershman, 2017, de Brigard, forthcoming).

If the proposed normativity is correct, there is a significant social benefit in settling inquiries. According to the principle of rationality, then, memory systems should prioritize elements that aid in settling inquiries. The evidence discussed, indicating that people remember more accurately what they are asked—especially in frequently asked questions—suggests that this principle is at work in inquiry contexts. In line with Rational Analysis, the influence of frequent inquiries on the accuracy of specific elements can be explained by the history factor within need probability. This factor considers how frequently an element was *relevant* in past experiences. The fact that frequent inquiries shape memory in this way suggests that the inquiries dictate which elements are considered *relevant* to the memory system. Thus, we can conclude that the memory system is effectively working to settle inquiries by prioritizing elements that contribute to resolving them.

Rationality principles guide not only retrieval but also the encoding of information. The principle of need probability dictates which elements are encoded based on their likely future relevance. This explains why answers are more accurate and detailed when participants are informed about the inquiry before the memory task and why question-making mnemonic technique is so efficient, due to the context factor.[5] Elements anticipated to be relevant are encoded with greater accuracy. The context factor also indicates that items mentioned in the inquiry and items most commonly associated with it in past experiences are more likely to be retrieved.

In summary, the memory system, governed by the principle of rationality, ensures the accuracy of elements relevant to specific contexts. In the case of inquiries, the relevant elements are those that help to settle the inquiry. Therefore, not all elements of a mnemic representation have the same importance for memory success. In the context of inquiries, only elements that aid in resolving the inquiry are considered relevant, which supports Success Atomism (SA) and aligns with a_1) rather than a). The next section will further explore this normativity using inquisitive semantics.

4 Settling inquiries: a preliminary model

[5] This does not conflict with individual strategies used to solve the task because RAM does not clarify the precise computations by which the system does its operations. (Anderson, 1990, Schooler & Anderson, 2017).

As discussed in the previous section, the success of memory in contexts involving inquiries depends on settling these inquiries (norm i), which in turn requires the accuracy of specific elements (norm ii). To refine these conditions, we can draw on contemporary philosophical and linguistic definitions of inquiry and its resolution. For example, besides modeling how inquiries select the specific elements relevant to the accuracy of memory, these definitions can also provide a preliminary model for understanding how memory success is contingent upon meeting a certain threshold of accuracy. This preliminary model will primarily reference recent work in inquisitive semantics (Ciardelli et al., 2013; Ciardelli et al., 2019).

Inquisitive semantics views inquiries as non-empty sets of propositions—the set of propositions that could potentially resolve the inquiry (Liefke, 2025).[6] This set must be downward closed, meaning that if it includes propositions p and q, it must also include any propositions that are informationally stronger, such as $p \cap q$ (Ciardelli et al., 2013; Liefke, 2025). Answers are understood as alternatives within the set of propositions that constitute the inquiry. These alternatives are maximal elements that provide just enough information to potentially settle the inquiry. Although alternatives may overlap, they remain distinct because they do not contain each other (Ciardelli et al., 2013; Ciardelli et al., 2019). A proper answer is the alternative that contains the correct information needed to resolve the inquiry.

To illustrate these concepts, consider the following example which demonstrates how inquiries determine the relevant elements. Suppose a company meeting was held yesterday, but only John and Mary could attend due to extreme weather. The next day, the CEO asks,

[6] To be more precise, inquisitive semantics distinguishes between information states and propositions, and defines inquiries in terms of the former rather than the latter. In my use of this framework in this paper, however, I limit myself to talking about propositions without going into further details of inquisitive semantics, thus proposing a rather simple model.

"Did John attend the meeting"? (I_1)

Let J represent the proposition "John attended the meeting" and M represent the proposition "Mary attended the meeting." We can understand the content inquiry I_1 as depicted in Fig. 1. In this figure, I_1 represents the logical space of the information of the inquiry. Alternatives *a* and *b* are the possible answers. In this case, alternative *a* is the proper answer to the inquiry, although *a* encompasses incorrect information.

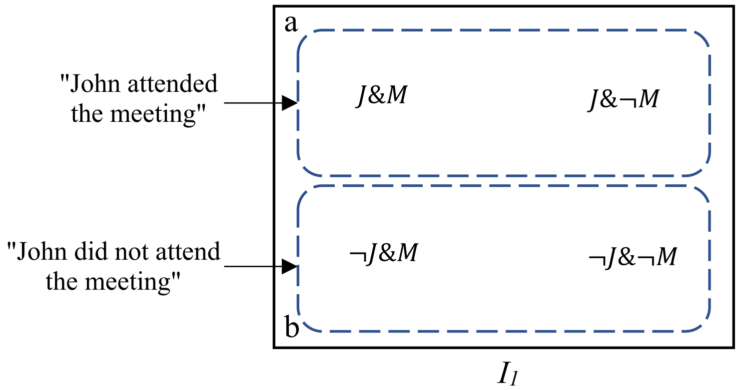

Fig. 1 – I_1 is the logical space of the inquiry "was John at the party last night"? Adapted from Ciardelli *et al* (2013, 2019).

As previously stated, alternatives are maximal elements that contain just enough information to settle the inquiry. In this context, alternatives *a* and *b* represent different ways to answer "John attended the meeting" and "John did not attend the meeting," respectively. Here, alternative *a* provides information confirming John's attendance, regardless of Mary's presence, while *b* provides information confirming his non-attendance, independent of Mary's attendance. Essentially, *the inquiry dictates how alternatives are framed and, consequently, which specific information is necessary to resolve it*. Consequently, if one answers, "John attended the meeting, but Mary didn't," the inquiry, which focused only on John's attendance, would be settled even if the answer contains false information. This framework allows us to model how an inquiry selects specific elements (pieces of information) from a broader informational context, indicating that only specific elements are crucial for accuracy in inquiry contexts. Incorrect or absent irrelevant (non-selected) information does not jeopardize the settling of the inquiry or, in cases of memory, the success of the memory.

Additionally, inquisitive semantics offers a preliminary model for (b), which is how to establish the degree or threshold of accuracy required for the success of memory. Again, the inquiry, by defining the alternatives, determines the necessary threshold of accuracy. For instance, consider the meeting attended by only John and Mary. Suppose someone asks the CEO of the company what was discussed in the meeting yesterday. Given that he was not there, he suggests that this person ask any of their colleagues who attended the meeting in order to acquire the wanted information. Accepting his suggestion, the CEO's suggestion, this person asks in return

"Who attended the meeting"? (mention-some) (I_2)

As correctly identifying any of the attendees is sufficient to settle the inquiry, this type of inquiry is sometimes called "mention-some" inquiry (Ciardelli *et al*, 2013). Its content is expressed in I_2. Conversely, if due to extreme weather many people were missing, and the authorities need to track all attendees to identify the missing, the inquiry "Who attended the meeting?" would require a complete answer, informing all the individuals present at the meeting, making it a "mention-all" inquiry because the inquiry would only be settled when all the individuals were correctly appointed. Its content is expressed in I_3.

"Who attended the meeting"? (mention-all) (I_3)

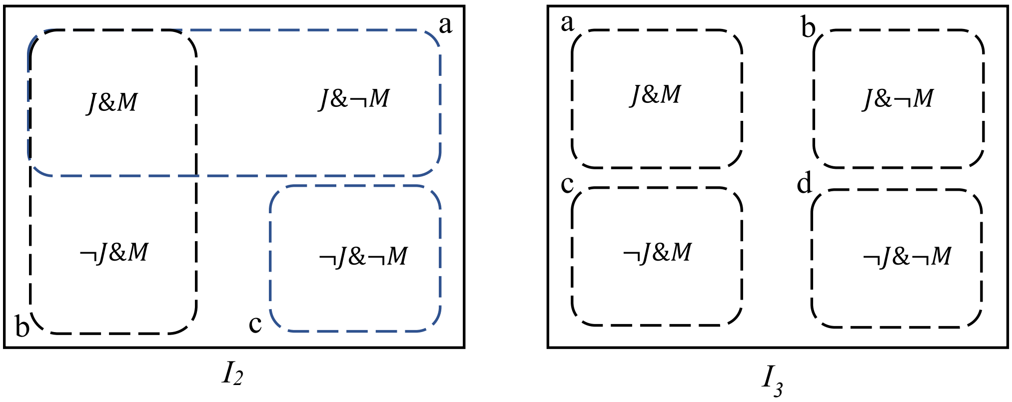

Fig. 2 – I_2 and I_3 represent the contents of the mention-some and mention-all inquiries, respectively. *a*, *b*, *c*, and *d*, are the alternatives in each inquiry. In the case of I_2, both *a* and *b* can settle the inquiry while in I_3, only *a* settles the inquiry. Adapted from Ciardelli *et al* (2013, 2019).

In I_2, the threshold of accuracy required is low because only minimal correct information is needed to settle the inquiry. Consequently, different answers such as "John attended the meeting" or "Mary attended the meeting" (alternatives *a* and *b*) are sufficient to settle the inquiry, even encompassing incorrect pieces of information. In other words, both alternatives *a* and *b* qualify as proper answers. In contrast, I_3 has a higher threshold of accuracy because it demands a more extensive amount of correct information to settle the inquiry. Here, the threshold of accuracy is inversely proportional to the scope of correct alternatives—the larger the required area of correct information, the lower the accuracy threshold. In I_2, the area covered by *a* and *b* is significantly larger than the area covered by *a* in I_3. More technically, the threshold of accuracy corresponds to the amount of information required by the inquiry.

This model can be effectively applied to mnemic content, as it can be analyzed in terms of propositions (Liefke, 2023, 2024). This approach is feasible because mnemic content, like propositions, is truth-evaluable (Fernández, 2006), can be articulated through ordinary language declarative sentences, and is involved in entailment inferences (Liefke, 2023, 2024, forthcoming). However, a mnemic scene contains significantly more informational richness than the simpler examples discussed so far. Consequently, the threshold of accuracy would vary in a more complex manner. For instance, if John and Mary went missing after the meeting due to severe weather, the authorities would need more detailed information—such as what they were wearing and when they left the meeting—to locate them. Let's consider the inquiry that demands all these pieces of information as I_4.

"Do you remember who attended the meeting, what clothes they were wearing and at what time they left the meeting"? (I_4)

Taking into account that the elements of mnemic content are both the objects/individuals represented and their attributes, the threshold of accuracy required would vary along two axes, one informing the number of correct individuals required and the other informing the number of attributes required. In the case of I_2, I_3 and I_4, the degree of accuracy required is depicted by their respective circles in Fig.3.

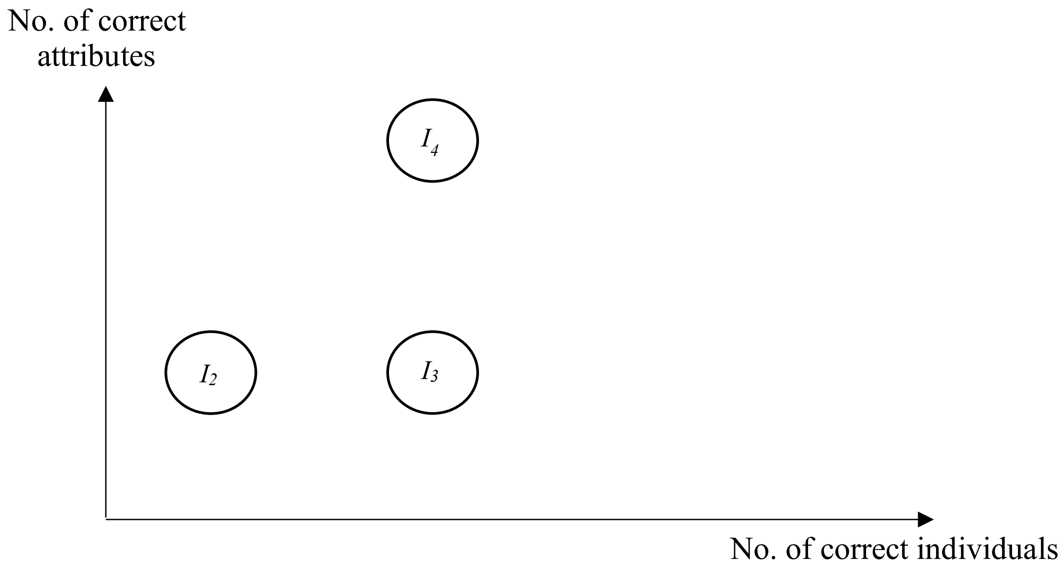

Fig. 3 – Depiction of the different threshold of accuracy required by different inquiries.

In I_2, I_3 and I_4, accuracy is dependent on relevant elements (individuals and attributes) as there can still be many irrelevant elements present in one's mnemic content of yesterday's meeting. In addition to this, we can say that the threshold of accuracy required in a context is low (such as in I_2), when the number of relevant elements to settle the inquiry is low. We can say that the degree of accuracy required in a context is high (such as I_4) when the number of relevant elements to settle the inquiry is high. This way, we have a preliminary model both of how to assess the specific elements (a_1) and the degree/threhsold of accuracy required for success (b), as seen in SA. It is crucial to emphasize here that this degree of accuracy is not a matter of proportion of all hits and misses of the mnemic representation, as would be the case under an SH assumption (Section 2). Instead, what is being called "degree/threshold of accuracy" here, in the absence of a better term, is the absolute number of elements necessary to settle the inquiry, regardless of the total number of elements in the scene. In this sense, the totality of elements of the scene remains not relevant for the success of memory, maintaining the SA assumption.[7]

It is important to discuss the scope of this model, and thus SA, in memory. In Section 3, we saw that inquiries are common in the life of rememberers, capable of even shaping what the memory system considers as relevant. Furthermore, Koralus (2014) has argued that voluntary tasks can be expressed as inquiries and that the satisfaction of these tasks corresponds to the settling of the inquiries. For instance, if one wants to remember where she put her keys the last time she went home, she is performing the intentional task of remembering that information. This task defines the question "where did I put my keys?" whose answer constitutes the satisfaction of the task. Considering this, in fact, we can apply this model to inquiry contexts beyond social contexts, where the inquirer can also be the rememberer. By investigating one's own mind in order to retrieve an event to perform a task, one is using one's own memory to settle an inquiry. If that is the case, most cases of voluntary remembering could be modeled in terms of inquiry, where the normativity described in this paper applies (along with SA).

In support of this hypothesis, Panksepp (1998) aimed to uncover the underlying mechanisms responsible for the affective attitude associated with curiosity and inquiry behaviors. Of particular interest is the discovery that strategies and representational models employed for search behavior are also utilized in memory search, serving to satisfy internal curiosity or answer *one's own inquiries*, which moves inquiry contexts beyond social contexts. Memory search activates the same brain areas that Panksepp associated with the investigative attitude (Hills *et al*, 2012, Todd & Hills, 2020, Ovando-

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[7] It is possible that some of the relevant elements may be misremembered. In this case, a failure of this preliminary model is that it does not take this nuance into account, rendering as an unsuccessful instance of memory if any of the relevant items are incorrectly retrieved. Unfortunately, a more complete model is beyond the scope of this paper. However, I believe that an extension of the model just described will be able to account for these cases.

Tellez *et al*, 2022).[8] This suggests that this investigative attitude prompts memory recall to respond to interviewer's inquiries, supporting the idea that memory is triggered to satisfy inquiries and, therefore, the normativity discussed should apply to memory in these contexts. It is worth highlighting, in that case, that involuntary remembering may not be ruled by the same normativity. It can be the case that it has different norms for successful remembering. In fact, the functioning and phenomenology of involuntary remembering is significantly different from that of voluntary remembering (Barzykowski & Risløv Staugaard, 2016; Moulin et al, 2023). Hence, it would not be surprising that involuntary remembering has different success conditions. The discussion regarding involuntary remembering, however, is beyond the scope of this paper.

A final clarification is on the meaning of context adopted in this paper. I follow inquisitive semantics in defining the context in terms of the inquiry, the people involved (inquirer and answerer), and their temporal and spatial location (Ciardelli *et al*, 2013, Ciardelli *et al*, 2019, Groenendijk & Roelofsen, 2010).

5 Why social norms are relevant

A major objection or concern regarding the proposal of this paper relates to its appeal to social norms. What motivates this choice? And why are social norms relevant? These questions are crucial, primarily because the accuracy debate so far has not addressed success in terms of social normativity. Some authors appeal to intuitions (Bernecker, 2010, 2017; Rowlands, 2018), while others derive normativity from the function of memory (McCarroll, 2017, 2018; Dings et al., 2023; Sant'Anna, 2024). In light of the

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[8] Importantly, as noted in the previous paragraph, voluntary tasks can be expressed as inquiries (Koralus, 2014). However, this does not mean that voluntary tasks are the result of an internal dialogue in which the inquirer explicitly formulates the inquiry.

current debate, then, invoking social norms may appear, at best, irrelevant and, at worst, misleading. In this section, I address this objection and respond to the questions above.

A first possible answer is that the success of memory can be assessed from multiple perspectives—functional, intuitive, and social—which are not mutually exclusive. Indeed, Craver (2020), Openshaw (2023), and McCarroll et al. (2024), among others, distinguish between social norms and memory system norms. In their view, both are relevant but serve different purposes: the former for folk theorization about memory and the latter for scientific theorization. As these researchers argue, both forms of theorization are important for different human contexts and should not be seen as excluding one another. In this sense, the proposal of this paper can be read as an additional—and somewhat neglected—perspective on memory success. However, while valid and relevant, this answer is too weak to fully support the claims introduced in previous sections.

A stronger response is that social normativity actively shapes or modulates the functioning of the memory system. Therefore, if one seeks to investigate the success conditions of memory, it is essential to understand both the norms themselves and how they influence memory. In this view, social normativity becomes at least partially incorporated into the memory system. Some philosophers have defended or analyzed this possibility. Hutto and Myin (2017), Hutto (2017), and Myin and van Dijk (2022), for instance, argue that memory lacks internal normativity (i.e., biological function) for accurately representing the past. Instead, this normativity emerges exclusively through social interaction. For them, any theorization of memory success involving accuracy must consider social norms—there are no accuracy-related success conditions apart from them. This can be called the *radical enactivist view* of social norms in memory success.

In a different vein, McCarroll and Andonovski (forthcoming) endorse the mindshaping hypothesis, according to which cognitive systems, while possessing internal normativity, were shaped both phylogenetically and ontogenetically to support human navigation in the social world (Zawadzki, 2013, 2018). Using the concept of niche construction—the idea that how a population alters its environment changes the selective pressures it faces—Mameli (2001) coined the term "mindshaping" to refer to how social norms and expectations shape the social environment, which in turn imposes specific pressures on cognitive systems to align with those norms and expectations.

Adopting this framework, McCarroll and Andonovski (forthcoming) explore the hypothesis that memory evolved to satisfy social norms. They examine two specific hypotheses: (1) that the computational/algorithmic structure of memory was shaped by social norms, and (2) that metamemory was shaped to satisfy these norms. While they argue that more evidence is needed to support the first hypothesis, they provide strong support for the second. In particular, they show that the automatic recognition of a mental state as a memory—and its perceived success—depends on social interactions that introduce children to socially normative expectations of memory (see Fivush & Waters, 2019). This can be called the *mindshaping view* of the role of social norms in memory success.

In this paper, I will not discuss these views in depth, as I present a slightly different argument for the relevance of social norms. It is worth noting, however, that I disagree with the radical enactivist view that memory lacks any internal normativity related to accuracy. I align more closely with the mindshaping view in three key respects: that memory possesses internal accuracy-related normativity; that current evidence is insufficient to claim that the computational or algorithmic structure of memory has been modified to accommodate social norms; and that metamemory, in contrast, has indeed been shaped by social norms.

Where I diverge, however, is in my appeal to the evidence discussed in Section 3 to argue that social norms at least modulate the functioning of memory. That is, even if they do not alter the computational or algorithmic structure of memory, they exert a meaningful influence on how the system operates. As presented in Section 3, memory likely operates according to an algorithm similar to the one outlined in Rational Analysis, which prioritizes relevant information. As argued at the end of that section, there is evidence that social norms significantly contribute to determining what counts as relevant—thus modulating memory functioning, even if they do not reshape its underlying structure.

One might object that this kind of modulation could be reduced to attentional processes.[9] This objection can be interpreted in two distinct ways. On the first reading, it suggests a reductionist view: since attentional mechanisms modulate memory, there is no need to appeal to social norms. This interpretation, however, overlooks the fact that phenomena often involve multiple explanatory levels and modulatory factors, which justify their investigation from multiple perspectives (see Craver & Darden, 2013). Even if attentional mechanisms are responsible for implementing the modulation of memory, one should still ask why attention is directed toward certain types of information—namely, those relevant for answering inquiries in the first place. As the evidence in Section 3 suggests, this prioritization of elements that can answer inquiries is not innate but learned, which supports the view that these attentional patterns reflect internalized social norms.

The second interpretation of the attention-based objection holds that if the modulation is implemented by attentional mechanisms, then the normativity in question applies to attention, not memory. That is, this would be a case of attention-related rather than memory-related normativity. I reject this interpretation for two reasons. First, the target of the modulation is the functioning of memory. If this objection is correct, then attention merely serves as the means by which memory is modulated in order to conform to the relevant normativity. Second—and more importantly—as discussed in Section 3, memory operates to satisfy the normative expectations embedded in inquiry even when elements are not intentionally selected for later retrieval. In other words, this prioritization

[9] I thank one of the reviewers for introducing this objection.

of information occurs automatically, not just intentionally. Moreover, as noted, question-making mnemonic techniques enhance encoding and retrieval more effectively than merely paying attention to an item.

Interestingly, theories of attention distinguish between intentional and automatic forms of attentional control (Ciaramelli et al., 2008). While intentional attention is governed by executive processes in the prefrontal cortex, automatic attention is partially regulated by memory systems, particularly the hippocampus (Ciaramelli et al., 2008; Sherman & Turk-Browne, 2024). In particular, the hippocampus and related memory structures help determine what counts as relevant for automatic attention (McCormick et al., 2015; Sherman & Turk-Browne, 2024). So, if social norms influence what memory promotes as relevant, and memory, in turn, modulates automatic attention, then the direction of influence appears to move from social norms to memory, and from memory to attention. This supports the central hypothesis that social norms modulate memory functioning by partially determining what counts as relevant.

This hypothesis also aligns with recent findings in norm psychology, the interdisciplinary field that studies how social norms are acquired and maintained in humans and other animals (Kelly et al., 2025). Some norm psychologists posit a dedicated mechanism for norm acquisition (Sripada & Stich, 2006; Chudek & Henrich, 2011; Kelly, 2022), while others argue that social norms are acquired through the modulation of other cognitive systems, including memory (Colombo, 2014; Westra & Andrews, 2022; Heyes, 2024). This tension arises because once social norms are acquired, they define what is relevant for a wide range of cognitive systems. The resulting impasse is whether norm acquisition reflects a distinct cognitive mechanism that modulates others, or whether it simply consists in the modulation of pre-existing systems (Kelly, 2022; Heyes, 2024). Regardless of this theoretical divide, there is a broad consensus in norm psychology that social norms modulate various cognitive systems—including memory—by shaping what counts as relevant. In short, even if social norms do not reshape the computational or algorithmic architecture of memory, they influence its functioning by helping determine which information is prioritized.

This is not to say that social norms are the sole determinant of relevance. Survival-related factors also play a crucial role in defining what information is relevant, independently of social norms. This suggests that some dimensions of relevance are innately specified. Empirical research consistently shows that survival-related stimuli—such as snakes (which pose a threat) or ropes near cliffs (which may help in securing safe passage)—are more easily encoded and retrieved than survival-neutral stimuli (Nairne et al., 2017; Aronowitz, 2019; Andonovski, 2021). These findings lend additional support to the SA, independently of social norms.

What matters for our purposes, however, is that, by shaping what counts as relevant, social norms modulate memory functioning. If memory's function includes prioritizing relevant information (Anderson, 1990), then its success hinges on making such information accessible (Gershman, 2024; see also Andonovski, 2021). Social norms, by defining relevance, thus establish the conditions for memory's success or failure. In this respect, social norms do not merely define what a successful memory looks like from an external perspective (i.e., how agents evaluate memory), but also contribute to what constitutes success internally—based on the system's functional properties. Thus, examining social norms is not just an optional perspective in the accuracy debate; it is essential to a proper account of memory success, even from a functionalist standpoint. This is why the present paper highlights the role of social norms and argues for their importance in the debate.

In the next section, I discuss an important consequence of the model and hypothesis defended in this paper. I also consider other potential objections.

6 Consequences and more objections

The paradigmatic case of inquiries, considering the previous discussion, allows us to confidently infer that the entirety of the mnemic scene is not crucial for the success of memory. For example, if the question is about which animals one saw at the circus, accurately recalling details about the food, clowns, or even the circus structure is irrelevant to the inquiry's success. Conversely, remembering the animals accurately would suffice, even if other aspects of the mnemic representation are inaccurate. Therefore, in inquiry contexts, memory should focus on providing the relevant elements with sufficient accuracy to meet the informational demand of the inquiry.

Consequently, since SH is a strong claim about all remembering instances, SA is more probably right in light of inquiry contexts.[10] Rejecting SH in favor of SA has significant consequences for the Philosophy of Memory, particularly for the accuracy debate. The greatest dispute on this debate is about what memory is representing, i.e., what is the object of memory (Sant'Anna, 2024). A view known as authenticism holds that the object of memory includes both the past experience and the past event (McCarroll, 2023; Bernecker, 2017). Alethism argues that the object is solely the past event (Michaelian & Sant'Anna, 2022). More recently, pisticism suggests it is the object of the past experience (Michaelian, 2024). Particularly, all of them agree that the memory system should be mostly successful and not frequently unsuccessful. Based on this agreement, Michaelian and Sant'Anna (2022) and Michaelian (2024), argue that memory does not represent the past experience because observer memories (memories with a third person visual perspective) are frequent and observer memories are inaccurate with respect to the past experience. Therefore, memory would be frequently unsuccessful if it

[10] Inquiry contexts reinforce that SA should be adopted because it is not a specific subset of elements that, when accurate, ensures memory success in every context, like animate elements, in the case of survival (Nairne *et al*, 2017). Instead, in each context a different subset of elements is selected as relevant for the success of memory. Therefore, it is reasonable to conclude that the social norms discussed in Section 3 and preliminarily modeled in Section 4 favor the adoption of SA.

represented the past experience. Since the agreement is that memory is mostly successful, that would be a problem for authenticism.

This conclusion, however, is valid only under a SH assumption.[11] Under an SA assumption, the inaccurate elements, such as the visual perspective in this case, could be irrelevant and, therefore, would not entail failure. In fact, although not impossible, it is not easy to think of situations in which visual perspective would be relevant. Moreover, observer memories are accurate with respect to some elements and inaccurate with respect to others (St-Jacques, 2024). If SA is adopted, it would be valuable to analyze whether these elements are relevant in the context in which they are retrieved. Thus, adopting SA has significant implications for current discussions about memory accuracy conditions.[12]

It is important to clarify the nature of this argument. The accuracy debate has primarily focused on the object of mnemic scenes *qua* mnemic representations—that is, what they represent or the type of object they refer to. In this debate, there has been a tacit agreement that any hypothesis about this object should result in memory being mostly successful (e.g., McCarroll, 2017; Michaelian & Sant'Anna, 2022; Dings et al., 2023). The point emphasized in this paper is that most participants agree that, for memory to be successful, the scene *as a whole* must be accurate beyond a certain threshold (i.e., they

[11] Even under SH assumption, their argument fails because it does not consider different degrees of accuracy (b).

[12] One of the reviewers pointed out that since alethism considers visual perspective irrelevant to accuracy, it seems to adopt SA. This conclusion is incorrect, because alethism does not consider visual perspective to be "irrelevant" in the sense of SA. Instead, alethism assumes that the mnemic scene represents the past event, and since the past event can be accurately represented from a variety of perspectives, third-person perspective does not affect the accuracy of memory. Thus, for alethists, the element "third-person visual perspective" is not inaccurate, given the object that they believe the memory has. For SA, even if it were inaccurate, it would not be relevant to the success of memory.

implicitly assume SH). Here, I argue that this assumption should be rejected in favor of SA.

By challenging this shared assumption, I am not suggesting—when criticizing Michaelian and Sant'Anna's argument—that their conclusion is mistaken. Rather, I use their argument as an example of how the broader debate relies on a flawed premise (SH). In their case, they reject authenticism on the grounds that it would render memory mostly unsuccessful, an argument that itself depends on SH. Thus, my aim is not to defend any particular view in the accuracy debate but to show that the arguments within it rest on a mistaken assumption.

Moreover, the relationship between SA (or SH) and any of the views in the debate is not straightforward. As mentioned, most of these views assume SH. Therefore, SH does not necessarily favor one view or another. More importantly, neither SA nor SH are theses about the object of memory and, therefore, they do not directly tackle the issue under dispute in the debate.

It is plausible, however, that salient elements guide the construction of scenes and, consequently, shape the type of scene produced and the type of object it represents. For instance, Mahr and Schacter (2024) show that the vividness of entire scenes depends on the vividness of specific elements, suggesting these elements serve as the basis for scene construction. Additionally, depending on the information required in an inquiry, scenes are constructed in either first- or third-person visual perspective (Nigro & Neisser, 1983; Libby & Eibach, 2011), further supporting the idea that scenes are built from particular elements. Further investigation into this possibility could help clarify the connection between SA and the current views in the accuracy debate.

Philosophers who adopt SH could object that memory retrieves only the relevant elements. In this case, the totality of the representational scene would be relevant and, therefore, would be equally important for assessing the success of memory thereby safeguarding SH. However, it is important to consider that the content of memory are scenes, that, in turn, are informationally rich depictions of past events (Hassabis & Maguire, 2009, Liefke, 2024, forthcoming, Brown, 2024). As such, it contains many elements, some of which are likely to be irrelevant for the inquiry in question.

Moreover, there is a contextual gap between encoding and retrieval. At encoding, the memory system selects which elements are *likely* to be relevant in the future, at retrieval. That may lead to cases in which the elements that are *actually* relevant at the moment of retrieval were not encoded. The construction system uses stored information about these elements to reconstruct a scene of the past event (Hassabis & Maguire, 2009, Cheng & Werning, 2016, see also Addis, 2020). However, if the stored information is irrelevant to the current context of retrieval the constructed scene would be unsuccessful—a memory failure. For these reasons, memory most likely represents not only relevant elements at retrieval.

One could also object that social norms require the reliability of memory, which, in turn, requires that the entirety of the elements of the mnemic content to be accurate over a degree. For instance, in a courtroom, one’s testimony can be rejected if one’s memory is considered as unreliable (Campbell, 2003). The reliability of one’s memory is assessed at the court through various approaches. One can show medical records that indicate deficiencies in the witness memory systems. One can also look for inconsistencies and falsities in the witness memory reports during the trial. Given this latter and frequent way of assessing the reliability of a witness' memory, the witness' mnemic content should be overall flawless during the trial in order to be considered as reliable and successful, which could favor SH.

However, SA can account for this by recognizing that in some contexts, such as courtroom settings, nearly flawless memory may be required. As seen in Section 4, inquiries may require a high threshold of accuracy, meaning that a large amount of correct information is need to settle the inquiry (Fig.3). Courtroom contexts typically demand a nearly flawless mnemic representation (very high threshold), while everyday contexts do not scrutinize memory for minor inconsistencies (medium or low threshold), and memory success depends on specific elements rather than on the overall representation (Sections 3 and 4). Thus, even when contexts demand near-flawless memory, SA can explain this in terms of the inquiry normativity proposed earlier. Furthermore, if SA reflects the functioning of the memory system, as the Rational Analysis of Memory suggests, then its *reliability* should not depend on the entirety of the mnemic content (see also Nanay, 2023). Adopting SA thus has important implications for theorizing about both the accuracy and reliability of memory.

6 Conclusions

In this paper, I examined two competing assumptions that are present, mostly unnoticed, in philosophical discussions regarding episodic memory accuracy. On the one hand, some consider that the success of a mnemic representation depends on the accuracy of all the elements in the representation (SH). On the other hand, some consider that the success of a mnemic representation depends on the accuracy of specific elements and that these elements are selected by the context (SA). I defended SA, arguing that the memory system selects specific elements to be more accurate given some contexts. I chose inquiry contexts as a paradigmatic case and presented a preliminary model of how to assess accuracy in these contexts under a SA assumption. Importantly, both assumptions should be kept in mind in philosophical discussions on the accuracy of memory because they have important consequences for the current debate, as they serve as the basis for many of the arguments used. In addition, it is possible that other assumptions may turn out to be true. I hope that this paper moves the discussion to more fundamental questions about what assumptions should be used when arguing for different views in the accuracy debate.

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The author has no competing interests to declare that are relevant to the content of this article.

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