Impact of aphantasia on identity and directive function of autobiographical memory

Prany Wantzen[1, *] & Arnaud Witt*
[1] *LEAD-CNRS UMR5022, Université Bourgogne, Dijon, France.*

ABSTRACT

Autobiographical memory (AM) enables us to relive or imagine personal experiences. AM presents three main functions: identity (our experiences build our identity), directive (our experiences guide our behavior to adapt to future scenarios), and social (creating and maintaining social bonds). The recognition that individuals present a lack of mental imagery – aphantasia – opened up new scientific avenues to study how mental imagery contributes to AM. Earlier studies revealed reduced AM capacities in aphantasia. However, no study has investigated the impact on AM's identity, directive, and social functions. In this study, participants with and without aphantasia completed AM self-questionnaires online. Aphantasic individuals report less use of their memories for identity or directive purposes than the non-aphantasic group but with no difference for social purposes. A lack of mental imagery seems to affect AM by impacting the sense of self and adapting to the environment but with no impact on social functions.

Keywords: aphantasia, autobiographical memory, identity

Impact de l'aphantasie sur les fonctions identitaire et directive de la mémoire autobiographique

RÉSUMÉ

La mémoire autobiographique (MA) permet de revivre ou d'imaginer des expériences personnelles. La MA présente trois fonctions principales : identitaire (construction de notre identité), directive (nos expériences nous guident pour s'adapter à des scénarios futurs) et sociale (création et maintien de liens sociaux). La reconnaissance d'individus présentant un manque d'imagerie mentale – l'aphantasie – a ouvert de nouvelles voies scientifiques pour étudier les liens entre MA et imagerie mentale. Des études antérieures ont montré que la

* Corresponding author: Prany Wantzen, Université de Bourgogne, LEAD – CNRS UMR5022, Pôle AAFE, 11 Esplanade Erasme, 21000 Dijon. E-mail: prany.wantzen@u-bourgogne.fr ; arnaud.witt@u-bourgogne.fr

MA était altérée dans l'aphantasie mais aucune n'a examiné l'impact sur ces trois fonctions. Dans cette étude, des participants avec et sans aphantasie ont rempli des auto-questionnaires en ligne. Les personnes aphantasiques déclarent moins utiliser leurs souvenirs à des fins identitaires ou directives que le groupe contrôle, mais pas à des fins sociales. L'aphantasie semble affecter la MA en influençant sur le sens de soi et l'adaptation, mais sans impact sur les fonctions sociales.

Mots-clés : aphantasie, mémoire autobiographique, identité.

INTRODUCTION

Autobiographical memory (AM) refers to the ability to remember or imagine and consciously (re)experience personal events from our past or future. The use of AM in daily life can be divided into three main functions: identity, directive, and social (Bluck *et al.*, 2005; Bluck & Alea, 2011). The identity function allows us to construct and maintain a sense of identity and coherence in time. Klein describes identity as being composed of episodic representation of the self (episodic AM) and semantic knowledge of the self (semantic AM) (Klein, 2012). Identity also considers self-consciousness, which refers to a sense of continuity over time, agentivity, introspection and physical identity. The AM is organized around identity, enabling memories to be better encoded and recalled (Howe & Courage, 1993). Self-relevant memories are particularly important in identity construction and are associated with self-perception quality. For example, memories that positively define yourself generate good self-esteem and, conversely, negative memories lower self-esteem (Çili & Stopa, 2015). Information is better retained if it is relevant to the self (self-revealing) or encoded in relation to the self (Rogers *et al.*, 1977; Symons & Johnson, 1997).

The directive function is used for problem-solving: our past experiences guide our choices and allow us to adapt to future events. Indeed, memory, which by definition seems to be devoted to the storage and retrieval of past memories, also plays a major role in problem-solving, imagination and the anticipation of future events (Klein, 2013; Suddendorf & Corballis, 2007; Szpunar *et al.*, 2014). In 2019, Conway updated the SMS reference model to include the future dimension of AM (Conway *et al.*, 2019). He highlights the strong involvement of autobiographical knowledge and memories in constructing future episodic thinking. AM can be especially helpful in open-ended problem-solving, where multiple solutions are possible and no single standard solution exists (Bluck &

Alea, 2009; Pillemer, 2001). The directive and problem-solving factors correlate highly, supporting the directive function of autobiographical memory (Bluck *et al.*, 2005).

Finally, the social function serves as a conversational tool, making it possible to develop and maintain social links (sharing and remembering a common event, talking about shared interests). AM originates in the experience of an event but is consolidated and reshaped through interactions with others. Telling one's story occurs in the context of social relationships (Goldman & DeNigris, 2015). The moment of discussion can be seen as one of the essential moments when individual memories become shared, and the past and future become a collective construction (model of Pasupathi, 2001). In this way, the construction of the AM closely depends on the development of the self and social cognition.

AM can also be described in terms of different properties. An autobiographical event is considered rich if it contains many contextual, spatiotemporal, sensory, and emotional elements (Conway, 2005; Rubin, 2005; Tulving, 2002). The ability to mentally relive a personal event and the vividness associated with that event are also central to AM (Tulving, 1985; Wheeler *et al.*, 1997). Furthermore, visual imagery has been robustly associated with AM (see Rubin, 2006, for an overview). Indeed, in line with scene construction theory (Hassabis & Maguire, 2007), visual imagery is involved in constructing complex sensory representations without sensory stimulation, allowing us to re-experience past experiences and simulate future events.

Some articles have looked at the link between the function and content of AM. Previous studies showed that autobiographical memories, considered central to the identity of participants, are reported to be more emotional, vivid, and frequently rehearsed (Pociunaite & Zimprich, 2023). These characteristics highlight the importance of detailed and emotionally rich memories in maintaining a coherent self-concept. In their review, Vanderveren *et al.* (2017) present that the specificity and coherence of AM, enriched with sensory and emotional details, are crucial for psychological well-being and identity formation. Other studies suggest that people with low self-concept clarity are more likely to use and recall the past for purposes of self-continuity, suggesting that memories can be used to 'remind' an individual of their sense of identity (Bluck & Alea, 2008; Jiang *et al.*, 2020).

In the same way, episodic specificity induction improves problem-solving (Madore & Schacter, 2014). The directive function was significantly correlated with future orientation, suggesting that people with a more relaxed view of the future report using AM more to direct their

current and future behavior (Bluck & Alea, 2011). Imagining future events is associated with fewer details and less vividness than remembering past events (Berntsen & Bohn, 2010). The increased vividness of emotional memories can influence future decisions by providing a stronger subjective basis for evaluating similar situations. (Phelps & Sharot, 2008)

Finally, the frequency of using one's past as a social bonding function was related to higher extroversion and was not associated with self-concept clarity or future orientation (Bluck & Alea, 2011). Rich episodic details (e.g. emotional and sensory details) enhance the relatability and credibility of memories, fostering trust and deeper social connections (Hirst & Echterhoff, 2012; Pasupathi, 2001; Wang *et al.*, 2018).

AM is a complex mechanism, and the interest in interindividual heterogeneity in AM is growing. This heterogeneity may concern the degree to which autobiographical memories are central to an individual's self-narrative and identity (Berntsen & Rubin, 2006; Gehrt *et al.*, 2018; Rubin, 2020a; Rubin *et al.*, 2019), the extent of the recollective experience (Berntsen *et al.*, 2019) and scene recall (Rubin, 2020b). Other works have shown links between object imagery ability and the recall of specific perceptual details of past events (Vannucci *et al.*, 2016) and future events (Sheldon & El-Asmar, 2018). Finally, D'Argembeau & Van der Linden (2006) reported that individuals presenting more vivid visual imagery during remembering produce more phenomenologically rich memories. However, the majority of these studies employed a correlational approach. Another way to understand these aspects is to study specific populations presenting impairment in an element involved in AM functioning.

Interestingly, 2-3% of the population present a marked deficit in or complete lack of voluntary visual imagery – a neuroatypical condition named "aphantasia" (Zeman, 2024; Zeman *et al.*, 2015). Aphantasia concerns not only visual imagery, as all sensory imagery may be affected (Dawes *et al.*, 2020). Objective measures of the sensory strength of imagery show that people with aphantasia present a real absence or lack of voluntarily generated internal visual representations rather than a difficulty in metacognition or self-report bias (Dawes *et al.*, 2020; Keogh & Pearson, 2018; Wicken *et al.*, 2021). Aphantasia appears to be a neuropsychological condition in which sensory imagery is, so to speak, "knocked out", and it helps us better understand the role of sensory imagery in AM and its implications in daily life.

Despite the increased scientific interest in aphantasia, the implications of decreased mental imagery in AM functioning are relatively recent and

need to be investigated in more detail. Previous studies found that aphantasic participants reported fewer sensory and emotional details than the corresponding control groups, both for past and future projections (Dawes *et al.*, 2020, 2022; Milton *et al.*, 2021; Monzel *et al.*, 2023; Wicken *et al.*, 2021; Zeman *et al.*, 2020). Impairments of AM richness in aphantasia have been identified on the basis of both subjective measures (self-reports) (Dawes *et al.*, 2020; Monzel *et al.*, 2023; Zeman *et al.*, 2020) and objective measures (the Autobiographical Interview, Levine *et al.*, 2002). The results found with objective AM measures show that aphantasic groups retrieve significantly fewer sensory and spatial details than controls (Dawes *et al.*, 2022; Milton *et al.*, 2021). Past and future reported events have been found to be less vivid, emotional, and coherent than in non-aphantasic participants. Thus, all these studies indicate that individuals lacking visual imagery have AM impairments at different levels.

However, standard AM assessments tend to focus on the quality of the properties of a rich recollection of specific events (contextual, spatio-temporal, sensory, and emotional details) cued by a particular period. This method can introduce selection bias and neglect individual differences which could play a role in AM recollection (Greenberg & Knowlton, 2014; Rubin, 2020a; Rubin *et al.*, 2019). Furthermore, objective evaluations are much more time-consuming than typical AM tests. They generally require face-to-face interviewing and precise coding, with high interrater reliability being required if the obtained measures are to be considered robust. To address these issues, Berntsen and colleagues recently developed a questionnaire to measure the more general functioning of autobiographical recollection (Autobiographical Recollection Test, ART, Berntsen *et al.*, 2019). The ART evaluates general recollective experiences associated with memories rather than focusing on how accurately individuals remember one or two specific events. It correlates with the recollective qualities of specific past and future events (Gehrt *et al.*, 2022), suggesting that the general evaluation of AM recollection is reliably linked to how people remember particular events.

What is more, no study has as yet investigated how AM impairment resulting from a difficulty in creating mental images might impact identity, directive, and social functions. This is a significant gap in our understanding, as it could affect individuals' sense of self, decision-making processes, and social interactions.

This study aims to investigate whether aphantasia could affect AM's identity, directive, and social functions. We used self-reported questionnaires tailored to each AM sub-function to measure the impact of decreased mental imagery in these areas. Secondly, we wanted to find

whether people with aphantasia also have difficulties with the more general functioning of autobiographical recollection. Third, we explored the relationship between the functions and the general functioning of AM. Our results open up an exciting line of research for further studies in which aphantasia can be used as a perspective from which to examine the relationship between AM and visual imagery. Previous research indicates that aphantasics show altered richness in the AM. We expect this to affect the AM's identity, directive, and social functions, as well as overall recollection functioning.

METHOD

Fifty-four participants were recruited online via Limesurvey: 25 participants with Aphantasia (19 women, M_{age} = 26.0, *SD* = 3.3) and 29 controls (20 women, M_{age} = 23.4, *SD* = 6.0). Aphantasic participants were recruited via the French association "Aphantasia Club". Control participants were recruited at the University of Dijon. The study followed the ethical principles of the Declaration of Helsinki.

An a priori power analysis was conducted using G*Power (Faul *et al.*, 2007) for sample size estimation, based on data from Monzel *et al.* (2023). In this experiment, the authors assessed memory performance in daily life for aphantasic (N = 156) and non-aphantasic individuals (N = 131), by means of the FEAG questionnaire (FEAG; Questionnaire for the Assessment of Everyday Memory Performance; Holzapfel, 1989). The subscale of the FEAG questionnaire dedicated to assessing autobiographical memory revealed that individuals with aphantasia (M = 2.33, SD = 0.72) reported less remembering than controls (M = 3.30, SD = 0.72), $t(222) = 9.70$, $p < .001$, $d = 1.30$, 95% CI [1.01, 1.58]. The effect size in Monzel *et al.*'s (2023) study was 1.30, which is considered large according to Cohen's criteria (Cohen, 2013). With a significance criterion of $\alpha = .05$ and power = .80, the minimum sample size needed with this effect size is N = 11 per group for a two-tailed test between two independent groups. Thus, the obtained sample ($N_{aphantasics} = 25$, $N_{non\text{-}aphantasics} = 29$) is adequate to test the study hypothesis.

After signing the informed consent form, participants completed the Vividness of Visual Imagery Questionnaire (VVIQ) (Marks, 1995; Zeman *et al.*, 2015), a 16-item scale that asks participants to imagine a person in

several scenes and rate the vividness of these mental images using a 5-point Likert-type scale. To explore AM functioning, participants then completed the Thinking About Life Experiences scale (TALE, Bluck & Alea, 2011; for the French validation, see Fritsch *et al.*, 2021) and the Autobiographical Recollection Test (ART, Berntsen *et al.*, 2019; for the French validation, see Billet *et al.*, 2023).

TALE is a 15-item self-report questionnaire exploring how individuals report using AM in daily life. Participants are instructed to indicate how often they think back over or talk about their past for a variety of purposes. Each item is preceded by: "*I think back over or talk about my life or certain periods of my life…*". This scale assesses the frequency with which people recall or talk about their past experiences with regard to the three main functions of AM: Self-Continuity (e.g. … *when I want to feel that I am the same person that I was before*), Social Bonding (e.g. … *when I want to develop more intimacy in a relationship)*, and Directing Behavior (e.g. … *when I believe that thinking about the past can help guide my future*). Responses are reported on a 5-point Likert-type scale, ranging from 1 = almost never to 5 = very frequently (see Bluck & Alea, 2011 for more methodological details). There were five questions for each of the three functions. We added up the score of questions for each function (min = 5, max = 25).

ART is a 21-item self-report questionnaire on a 7-point Likert-type scale. This test explores the subjective quality people attribute to seven properties of their past recollections (vividness, narrative coherence, reliving, rehearsal, visual imagery, scene, and life-story relevance). The instructions state: "*People vary a lot as to how they remember events from their life. The following questions are about how you remember your own memories for events you have experienced in the past. Please consider each item and indicate on a scale from 1 to 7 how much the description applies to the way you remember events from your past. Please consider how you remember past events and answer the questions in an honest and sincere way, by choosing a number between 1 (strongly disagree) and 7 (strongly agrée)*." For example, for the item Scene "*In my memories of past events, I remember where the actions, objects, and people are located in the events*" or for Life-story redevance: "*My memories of past events are a central part of my life story*" (See Berntsen *et al.*, 2019 for more details). There were three questions for each of the seven properties. We added up the score of questions for each propriety (min = 3, max = 21).

RESULTS

Aphantasic group reported significantly lower overall visual imagery vividness on the VVIQ (M = 19.06, SD = 4.98) than non-aphantasic participants (M = 62.69, SD = 8.24; U = 0.00, p < .001) (Fig. 1), confirming the lack of visual imagery in aphantasia (VVIQ ≤ 23; criterion according to (Zeman *et al.*, 2020).

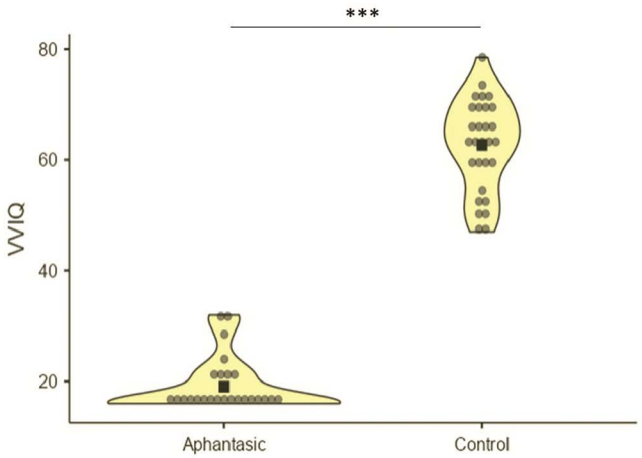

Figure 1. Scores on the Vividness of Visual Imagery Questionnaire (VVIQ) for aphantasic and control participants. Squares represent the mean. *** : p<.001
Figure 1. Scores obtenus au questionnaire sur la vivacité des images mentales (VVIQ) par les participants aphantasiques et les participants contrôles. Les carrés représentent la moyenne. *** : p < 0,001

Concerning the TALE questionnaire, aphantasic participants reported less frequent recollection of certain periods of their lives for identity or directional purposes than non-aphantasic participants (Table I, Fig 2A and B). No significant difference between groups was found for the social function (Table I, Fig 2C).

Table I presents the scores on the AM questionnaires. The aphantasic group reported significantly lower scores than the control group on each ART dimension (Table I). In other words, aphantasic participants rate the properties of their past recollections less highly: less vividness, narrative coherence, reliving, rehearsal, visual imagery, scene, and less relevance to their life-story.

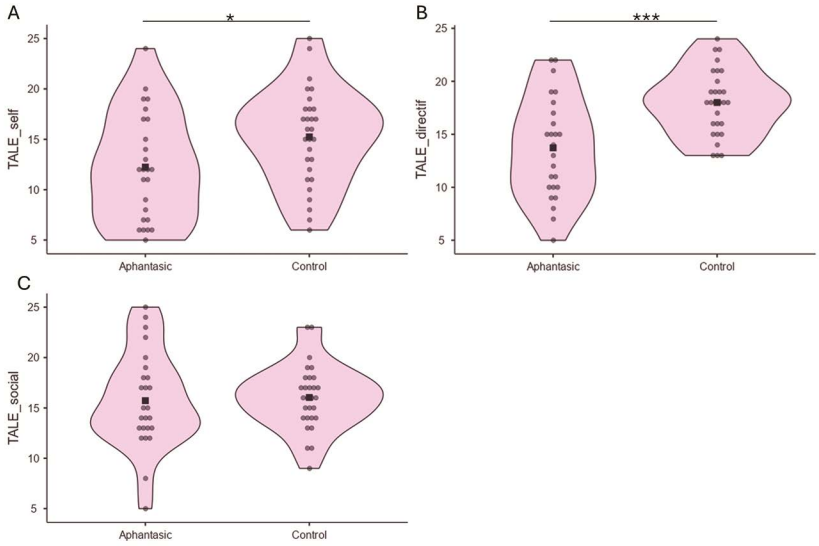

Figure 2. Scores on the Thinking About Life Experiences scale (TALE) for aphantasic and control participants. Squares represent the mean. * : p<.05; *** : p<.001
Figure 2. Scores obtenus à l'échelle Thinking About Life Experiences (TALE) pour les participants aphantasiques et les participants contrôles. Les carrés représentent la moyenne. * : p < 0,05 ; *** : p < 0,001

Table I. Detailed scores of Autobiographical Recollection Test (ART) for aphantasic and control participants.
Tableau I. Scores détaillés du test de souvenirs autobiographiques (ART) pour les participants aphantasiques et les participants contrôles.

	Aphantasic (N=25)	Control (N=29)		
Dependent variables	**Mean (SD)**	**Mean (SD)**	**U Mann-Witney**	**p value**
ART_Vividness	5.48 (2.47)	14.59 (3.31)	11	< .001
ART_Coherence	7.76 (3.83)	14.79 (3.20)	67.5	< .001
ART_Reviving	4.44 (2.33)	15.07 (3.95)	11.5	< .001
ART_Rehearsal	10.56 (3.16)	15.00 (4.33)	158	< .001
ART_Scene	8.76 (4.04)	15.62 (2.69)	73.5	< .001
ART_Visual imagery	3.44 (1.29)	16.66 (2.97)	0.5	< .001
ART_Life-story	10.28 (4.13)	17.79 (2.55)	51.5	< .001

We were also interested in the relationship between the ART and TALE questionnaires. Spearman tests indicated in the aphantasia group that the self-function of TALE was positively correlated with Vividness ($r(23) = .42$, $p < .05$), Scene ($r(23) = .46$, $p < .05$), Reliving ($r(23) = .43$, $p < .05$) and Life-story relevance ($r(23) = .41$, $p < .05$) reported by aphantasics. The directive function correlated positively with Vividness ($r(23) = .47$, $p < .05$) and Life-story relevance ($r(23) = .51$, $p < .01$), but not with any other dimension of the ART. The self-function and the directive-function was also positively correlated ($r(23) = .71$, $p < .01$). There was no significant correlation between social function and any of the dimensions measured by the ART.

In the non-aphantasic group, the directive function correlated positively with Reliving ($r(27) = .53$, $p < .01$) and Rehearsal ($r(27) = .41$, $p < .05$). The social function correlated positively with Rehearsal ($r(27) = .37$, $p < .05$). There was no significant correlation between self-function and any of the dimensions measured by the ART.

DISCUSSION

The present research opens the way for the scientific study of the relationship between AM and visual imagery. As expected, we confirmed a significant difference on the VVIQ, with mental images being less vivid in the aphantasia group than in the control group. Additionally, the aphantasic group is significantly less likely to remember specific periods of their lives for identity and directive purposes, but with no difference between groups for social function. Finally, our study revealed that individuals with aphantasia scored lower than the non-aphantasic group on each AM dimension.

Our study revealed that people who lack sensory imagery seem to make less use of their past experiences to build and maintain a sense of identity and coherence over time. They also seem to use their personal events less often to guide their choices and enable them to adapt to future events. Interestingly, there is no difference in the social function between groups. Aphantasic participants report using their AM to develop and maintain social relationships just as frequently as non-aphantasic participants. This result may be because conversation offers cues that help memory retrieval. Compared to the identity and directive functions, which appear more often alone and provide fewer cues to help isolate

particular events, the social function involves a dynamic exchange with ongoing adjustments.

An explanation could also be provided by the nature of the TALE's instruction: "I think back over or talk about my life or certain periods of my life…" We can note that this sentence refers to autobiographical elements but is not necessary for episodic ones. Indeed, considering the role of semantic memory in AM (Conway, 2005) and according to the "semantic scaffolding hypothesis" (Irish & Piguet, 2013; La Corte & Piolino, 2016), the process of reconstructing an autobiographical event is guided by semantic knowledge, which acts as the basis and support for constructing the event.

A continuum seems to exist between unique events (i.e. episodic memory, e.g. my last hiking in the mountain with my friends), repeated events experienced personally (e.g. Christmas at grandparents' house every year), autobiographical facts (e.g. I was born in this city), and general facts (e.g. Paris is the capital of France) (Conway, 2005). Recently, Tanguay *et al.* (2023) showed a common brain network shared between these four memories with increasing activity from general to autobiographical facts, from autobiographical facts to repeated events, and from repeated to unique events. Waters and colleagues (2014) showed that specific events include more references to self-functions than social or directive functions. Whereas when the narratives describe repeated events and extended periods, there are more references to social functions and self-functions. These results indicate that social functions are associated with more semantic memories (repeated memories or extended periods). Moreover, unique events are generally remembered more vividly than repeated events in typical adults (Addis *et al.*, 2004; Holland *et al.*, 2011). The visual details are reported to decrease gradually: unique events contain more visual details than repeated events, than autobiographical facts, and than general facts (Tanguay *et al.*, 2023). This result indicates the importance of visual information in the episodic way but less significance in the semantic way.

Interestingly, studies have shown that people with aphantasia could use semantic memory as a compensatory mechanism. In their research, Dawes *et al.*, (2022) performed an objective AM evaluation and found that aphantasic and non-aphantasic participants mentioned similar elements of external details (i.e. semantic details) in the autobiographical events they reported. Nevertheless, these semantic details don't necessarily refer to autobiographical semantic. Another subjective questionnaire study (Palombo *et al.*, 2013) revealed that aphantasic and control groups did not differ on the semantic subscale (Dawes *et al.*, 2020). These results

could be interpreted that there isn't a compensatory mechanism in which semantic memory in aphantasic could be more present than non-aphantasic. In this line, a replication study reported in the same article showed that aphantasic individuals scored significantly lower than another control group on this semantic subscale (Dawes *et al.*, 2020). However, as previously mentioned, distinctions have been made between general semantic memory and autobiographical semantic memory. General semantic memory refers to one's non-personal, general knowledge of the world. In contrast, autobiographical semantic memory is personal and detached from the context of its acquisition. It includes personal factual knowledge and repeated events experienced personally, with contextual details abstracted across multiple instances (Conway, 2005).

Taken together, our non-difference in social function could be explained by considering 1) a decreased importance of visual detail with the semantization of the autobiographical elements, 2) the implication of semantic memory in social function, and 3) a more preserved semantic ability in aphantasia. Further studies are needed to better understand the social implications of an AM deficit and to explore how semantic memory or other abilities could be used as compensatory strategies in aphantasia.

Beyond the impact of the AM functions in daily life, we were interested in the qualities of the properties of remembered autobiographical events. The role found to be played by AM in aphantasia is consistent with previous studies (Dawes *et al.*, 2020, 2022; Milton *et al.*, 2021; Monzel *et al.*, 2023; Wicken *et al.*, 2021; Zeman *et al.*, 2020). By assessing the general recollective experience, we showed that the visual imagery, vividness, coherence, and spatial scene elements of AM are impaired in aphantasia, as had previously been shown for the objective evaluation of specific events (Dawes *et al.*, 2022; Milton *et al.*, 2021). Our results also highlighted the fact that participants with aphantasia reported repeating and reliving past events less often than non-aphantasic participants and that remembering a past event was less important for their life history. These findings have significant implications for understanding the role of sensory imagery in AM. Thus, a lack of sensory imagery seems to impact not only AM-related visual imagery but also many other properties of AM.

A reduction in all the dimensions of ART in the aphantasic participants may be surprising at first sight but may be explained by the nature of ART questions. All questions concern how memories from past events are in the different proprieties. For example, for Life-story relevance: "*My memories of past events are a central part of my life story*" or for Coherence: "*My memories of past events come to me complete, not in pieces with missing*

bits". ART didn't explore the general narrative coherence or semantic stories but how episodic past events are invested in these dimensions. Indeed, Berntsen *et al.* (2019) presented that the ART questionnaire correlated more strongly with Episodic than Semantic and Spatial memory (measured with the Survey of Autobiographical Memory-SAM, Palombo *et al.*, 2013). This is consistent with the ART measuring qualities of recollection – a key criterion of episodic memory, but less of semantic or spatial memory. The same study showed that people who recall their past with less detail and vivid imagery also tend to give their memories a worse life-story relevance and narrative coherence (Berntsen *et al.*, 2019). Future studies are needed to explore the different AM proprieties in aphantasia.

Finally, the Aphantasics group showed a positive correlation between self and directive functions. This result suggests that self-function is also affected when the directive function is impaired. In fact, both functions are impaired compared to the non-aphantasic group. The social function, on the other hand, seems to work differently. No correlation was observed between the social function and the proprieties of AM measured with ART. In contrast, less frequent use of the identity function in the aphantasic group is associated with less vivid recall, less detailing of scene elements, and less reliving. Less frequent use of the directive function is associated with less frequent use of memories as a relevant life story and with less vivid memory. In comparison, the non-Aphantacis group showed that frequent use of the directive function was associated with a sense of reliving and rehearsal. Better rehearsal is also associated with more frequent use of the social function. Aphantasic and non-aphantasic groups might show different relationships between AM properties and perceived function. We can hypothesize that the way memories are used in people with and without aphantasia appears to be different, with different processes. It will be important for future studies to explore the mechanisms involved in using AM in everyday life and how the absence of mental imagery might affect different cognitive abilities. Another hypothesis to examine might be the use of a different strategy or process for interacting with oneself, others, and the environment.

Nevertheless, future studies must confirm these observations by replication and using more objective assessment methods. It will be necessary to examine whether aphantasic people "just" use their past experiences less to develop a sense of self, solve problems, and form ideas about the future, or whether they employ alternative strategies to do this.

LIMITATIONS

Replication studies are essential to confirm our results. Online self-reports can also present some limitations. Even if it is important to note that aphantasia is not associated with difficulties in introspection or metacognition (Dawes *et al.*, 2020; Keogh & Pearson, 2018; Wicken *et al.*, 2021). Objective evaluations must additionally be performed to better understand the implications of aphantasia in AM and its related identity, directive, and social functions.

It should also be noted that Club Aphantasia is not a traditional club with physical meetings; it is an association focused on raising awareness and aiding in the self-identification of aphantasia. Its members, dispersed across France, primarily interact online by sharing personal experiences. Their engagement makes them valuable participants in AM research. Future studies could compare individuals aware of their imagery deficits with those not, using large-scale assessments like the VVIQ to deepen their understanding of aphantasia.

CONCLUSION

This exploratory study opens up new research avenues beyond the impact of a lack of imagery on AM and examines how it could be involved in self-continuity, projection into the future, problem-solving, or social function. For the first time, we explored how the lack of mental imagery in aphantasia seems to affect the sense of self, current decision-making, and problem-solving. Interestingly, these difficulties do not seem to interfere with the social functions of AM. It will be important to confirm these findings, which point towards exciting future research directions, using more objective measures.

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