The Visualizer's Fallacy: Why Aphantasia Skepticism Underestimates the Dynamics of Cognition

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Abstract

Aphantasia, namely the inability to voluntarily form visual mental imagery, does not, counterintuitively, impair the affected from successfully performing mental imagery tasks. One way of explaining this finding is to posit that aphantasics, despite their claim to the contrary, can form visual imagery, a position here referred to as aphantasia skepticism. This article outlines and rejects two types of aphantasia skepticism and argues that the position results from what is coined the visualizer's fallacy, namely the false belief that visual mental imagery is necessary to carry out mental imagery tasks. Furthermore, it is argued that the visualizer's fallacy and the resulting aphantasia skepticism are not only potentially harmful to aphantasics but may also lead to an impoverished view of the dynamics of cognition in general.

Keywords: aphantasia; mental imagery; aphantasia skepticism; visualizer's fallacy; visual imagery tasks

1. Introduction

For most people, acts of visualization, that is, the conjuring up of visual mental imagery in the 'mind's eye,' seem to play a central role for everyday cognition. However, the recent discovery that an estimated 3.9% of the general population appears to lack the ability to visualize (Dance et al., 2022), a condition nowadays referred to as *aphantasia* (Zeman et al., 2015), calls the importance attributed to visualization for cognition into question. Not only are so-called aphantasics (i.e., people with aphantasia) "getting along fine in the absence of visualization" (Zeman, 2020, p. 706; see also Monzel et al., 2023) but they are even able to perform tasks which are assumed to require the use of visual mental imagery, including mental rotation tasks (Kay et al., 2024; Pounder et al., 2022), visual working memory tasks (Bainbridge et al., 2021; Jacobs et al., 2018) or tasks assessing visual properties such as object shapes, object colors, letters, faces, and spatial relationship (Liu & Bartolomeo, 2023; Milton et al., 2021).

The "striking" (Zeman, 2020, p. 706) finding that a significant portion of the population is lacking an ability thought to be essential for general cognition and is even able to solve tasks for which they should, ex hypothesi, be impaired at, leads us to the *puzzle of aphantasia competency*.

> *Puzzle of Aphantasia Competency* (PAC): How are people who cannot visualize (i.e., aphantasics) able to solve visual mental imagery tasks?

One possible strategy for resolving the PAC is to posit that aphantasics, despite their claim to the contrary, can visualize. This position might be referred to as *aphantasia skepticism* (AS). As I will show below (Section 2), there are two versions of AS, each of which follows from attributing causal relevance to different aspects of mental imagery.

However, the PAC can also be resolved without positing that aphantasics have mental imagery, namely by arguing that aphantasics can solve the tasks in question because these tasks, despite being taken to be visual mental imagery tasks, do not necessarily require the use of visual mental imagery. In this paper, I take the second route to resolving the PAC, by defending the claim that the ability to visualize is not necessary to solve a range of tasks that have wrongfully been taken to necessarily rely on the use of mental imagery.

I will proceed as follows. In Section 2, I outline two uses of the term 'mental imagery,' leading us to two versions of AS. In Section 3, I argue that neither of the two versions of AS can satisfactorily resolve the PAC, based on the empirical evidence gathered on aphantasia. In Section 4, I introduce what I refer to as the visualizer's fallacy, namely the false belief that visual imagery tasks necessarily require the use of mental imagery and argue that both forms of AS arise due to a bias caused by the visualizer's own experience. Lastly, in Section 5, I consider some of the potential implications of the prevalence of the visualizer's fallacy for the mental health of aphantasics and our understanding of cognition. I conclude that overestimating the importance of visual mental imagery does not only potentially harm aphantasics but also leads us to a limited conception of our own cognitive abilities.

2. Two Types of Aphantasia Skepticism

Aphantasia skepticism (AS) describes a position that posits that aphantasics have visual mental imagery. However, depending on how one interprets '(visual) mental imagery,' AS can occur in two forms. To outline these forms, it is helpful to briefly consider the history of the term 'mental imagery.'

While mentions of mental images and imagination reach back at least as far as to Plato and Aristotle (MacKisack et al., 2016), Nanay (2023) points out that the term 'mental imagery' is a technical term first used by early experimental psychologists at the end of the 19th century. At its initial conception, the term was used to describe the specific phenomenology of what might colloquially be referred to as 'seeing with the mind's eye,' and the methodology used for assessment was to ask people to use introspection to report

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on their imagery experiences. Galton (1880), for example, instructed participants to visualize their breakfast table "as [they] sat down to it this morning" (p. 301) and to then score the coloring and illumination of their imagery.[1] I will refer to this *experience*-centric use of the term as mental imagery$_E$.[2]

As psychologists (and later neuroscientists) developed more advanced methods to assess the underlying processes of mental phenomena, the experience-centric understanding of the term got expanded by a *representational* component. Nowadays, mental imagery refers to "representations and the accompanying experience of sensory information without a direct external stimulus" (Pearson et al., 2015, p. 590), where 'representations of sensory information' are understood as representations in the (early) visual cortex (Kosslyn, 1994; Nanay, 2023). More specifically, according to the currently dominant *reverse hierarchy model* (Dijkstra et al., 2019; Pearson, 2019), mental imagery is represented in the primary visual cortex (V1)[3] in the same manner that external visual stimuli are represented in V1, namely as depictive representations (Kosslyn et al., 2006). Simply put, when we look at a triangle (in the world), this correlates with a roughly triangle-shaped (depictive) activation in our V1, and when we visualize a triangle, an equivalent triangle-shaped (depictive) activation occurs (Slotnick et al., 2005). I will refer to the *representation*-centric use of the term as mental imagery$_R$.[4]

Contemporary cognitive science further distinguishes between *object imagery*, namely the representation of visual properties such as color and shape, and *spatial imagery*, namely the representation of spatial structures, motion, and location (Chabris et al., 2006). Following this distinction, aphantasia is understood as an object imagery deficiency (Zeman, 2024; but see Palermo et al., 2022 for an argument towards the inclusion of a spatial aphantasia subtype).

In sum, talk about (visual) mental imagery can refer either to mental imagery$_E$ (i.e., the subjective experience of 'seeing' [object] imagery with the 'mind's eye'), or to mental imagery$_R$ (i.e., depictive representations in V1 that occur in the absence of a direct external corresponding stimulus).

In line with the distinction between mental imagery$_E$ and mental imagery$_R$, AS can thus occur in two forms.

> *Aphantasia Experience Skepticism* (AES): The position that aphantasics do not lack the visual mental imagery experience (mental imagery$_E$)

> *Aphantasia Representation Skepticism* (ARS): The position that aphantasics do not lack the visual mental imagery representation (mental imagery$_R$)

Since the majority of the general population is not familiar with mental imagery$_R$, most of the AS that aphantasics encounter is AES. However, AES is by no means restricted to the non-academic sphere, as is obvious from the report of the aphantasic psychology professor Bill Faw, who recalls that "psychologists and philosophers" he encountered at conferences expressed "disbelief" that he really "see[s] nothing" when he closes his eyes (Faw, 2009, p. 2). More generally, any account that questions the validity of imagery self-reports (e.g., Schwitzgebel, 2011) lends itself to AES.

While AES posits that aphantasics do not lack mental imagery$_E$, proponents of ARS grant that aphantasics lack mental imagery$_E$ but maintain that they have mental imagery$_R$. An example of ARS is Nanay's suggestion that the competency of aphantasics can be explained by positing that they use "unconscious mental imagery" (Nanay, 2021, p. 6). On Nanay's account, when an aphantasic is told to visualize a triangle, say, they form the relevant depictive representation (a triangle-shaped activation in their V1) but this representation occurs unconsciously, that is, without an accompanying experience (i.e., without mental imagery$_E$).

Thus, depending on which interpretation of mental imagery is used, AS implies different commitments (and hence makes different predictions) with respect to the aphantasics' ability to generate mental imagery$_E$ and mental imagery$_R$.

3. Considering the Empirical Evidence

In this section, I turn to the empirical evidence derived from experiments on aphantasia and argue that neither AES (Section 3.1) nor ARS (Section 3.2) can account for the competency of aphantasics on (visual) mental imagery tasks.

3.1 Aphantasia Experience Skepticism

Aphantasia Experience Skepticism (AES) posits that aphantasics do not lack mental imagery$_E$. Since proponents of AES usually do not want to imply deception on the part of the aphantasics (though Faw [2009] implies that this, too, occurs), AES is best characterized as a view that posits the difference between aphantasics and (typical) visualizers as a difference at the *linguistic* level. That is, aphantasics and

[1] Some participants in Galton's experiment reported to have "no power of visualizing," (Galton, 1880, p. 306), thus marking the first documented report of what is nowadays referred to as aphantasia.

[2] Mental imagery$_E$ is co-extensive with the notion of (visual) sensory imagination (Currie & Ravenscroft, 2002; Noordhof, 2008) used in the philosophy of imagination literature.

[3] Mental imagery is also taken to be represented in other early visual areas, such as V2 and V3. However, since most of the empirical studies investigating aphantasia focus on V1, and since V1 plays a crucial role in arguments for depictive representations (e.g., Pearson & Kosslyn, 2015), I use V1 here as the target for the claim that aphantasics have mental imagery$_R$. However, not all researchers agree on the importance of V1 for visual imagery (Bartolomeo, 2002; Spagna et al., 2021, 2024) and it should be kept in mind that arguments about ARS are always relative to a specific theory about the neural correlate of visual imagery (Scholz, 2024).

[4] While Pearson et al.'s (2015) definition includes both mental imagery$_E$ and mental imagery$_R$, an example of a definition of mental imagery that only essentially involves mental imagery$_R$ (and remains neutral on the involvement of mental imagery$_E$) is Nanay's (2021, 2023) definition of the term as "perceptual representation that is not directly triggered by sensory input" (Nanay, 2023, p. 4).

visualizers differ in the way they *describe* their experience, but not in their experience as such (Lorenzatti, 2023).

One argument in favor of AES may be that aphantasia is often assessed via self-report-based inventories, such as the *Vividness of Visual Mental Imagery Questionnaire* (VVIQ; Marks, 1973), meaning that a certain interpretation of one's imagery experience may suffice to fulfill the criteria. Another, more general worry might be that AES cannot be rejected by empirical evidence since we do not have a way of assessing mental imagery$_E$ directly. That is, we might assess the aphantasics' behavior or scan their brains, but we cannot know for certain what they (subjectively) experience.

Three points should be noted here. Firstly, the argument that mental imagery$_E$ is not directly assessable is not an argument in favor of AES, since it allows for the (type of) experience of aphantasics to be different from that of visualizers as much as it allows for it to be the same. Hence, to settle the question, we must resort to the best available indirect evidence for mental imagery$_E$. Secondly, while self-report tools may be vulnerable to the agent's interpretation of their own experience, other methodologies bypass these limitations by assessing more objective, e.g., physiological indicators of mental imagery$_E$, such as pupillary light response (Laeng & Sulutvedt, 2014). Thirdly, if the evidence gathered from objective (non-self-report-based) assessments correlates with the aphantasics' self-report (e.g., their VVIQ scores) in cases where both are assessed, then this lends additional credence to the self-report tool as a valid measure of the construct in question (Grimm & Widaman, 2012).

When we take these three points into consideration, we can quickly reject the assumption that aphantasia is reducible to a difference at the linguistic level, based on the available empirical evidence. For not only does objective (non-self-report-based) evidence for differences between aphantasics and visualizers exist, but this evidence also correlates with VVIQ scores (see Zeman, 2024 for a recent review). For example, when being read scary stories in the dark, aphantasics produce significantly less sweat than typical visualizers do (Wicken et al., 2021), and while visualizing a bright stimulus leads to pupillary constriction in typical visualizers (Laeng & Sulutvedt, 2014), this effect is absent in aphantasics (Kay et al., 2022). Furthermore, Keogh and Pearson (2018, 2024) report that while visualizing a color primes typical visualizers on a binocular rivalry task[5] (Pearson, 2014), the priming effect is absent for aphantasic subjects. Lastly, neuroscientific evidence (Liu et al., 2023; Milton et al., 2021) suggests that the brain activity of aphantasics during visualization attempts deviates at least partially from that observed in typical visualizers, thus also pointing against the hypothesis (implicit in AES) that the difference between aphantasics and visualizers can be reduced to a mere linguistic (interpretational) difference.

Taken together, the (indirect) objective evidence for the absence of mental imagery$_E$ in aphantasics, which correlates with their reported VVIQ scores, as well as with differences at the neuronal level, therefore clearly points against AES.

3.2 Aphantasia Representation Skepticism

Aphantasia Representation Skepticism (ARS) grants a difference between aphantasics and visualizers at the experiential level (mental imagery$_E$) but maintains that there is no difference between the two with respect to the underlying neural representation (mental imagery$_R$). More specifically, ARS posits that aphantasics, just like visualizers, have depictive content-specific representations in their V1 during visualization attempts, and that these representations explain their ability to solve visual mental imagery tasks.

ARS can account for at least some of the observed objective differences between aphantasics and visualizers. For example, the finding that aphantasics produce less sweat when listening to scary stories than visualizers do (Wicken et al., 2021) could be explained by positing that while both possess mental imagery$_R$, it is the accompanying conscious experience (mental imagery$_E$) that leads to the heightened sweat response in visualizers. Note, however, that ARS cannot account for the binocular rivalry findings, since these imply differences at the sensory level, thus pointing against unconscious imagery (Keogh & Pearson, 2018, 2024).

Evidence seemingly in favor of ARS comes from a recent study (Cabbai et al., 2024) that found that aphantasics generate content-specific representations in V1 when passively listening to sounds (e.g., dog barking). However, the same study found that when aphantasics were told to visualize something in response to the auditory cues (instead of merely passively listening to them), the relevant neural representation was absent. This finding is remarkable because while active visualization, compared to passive listening, in visualizers (unsurprisingly) led to stronger V1 activity, visualization attempts in aphantasics did not only result in non-improved V1 activation, compared to passive listening, but to an *absence* of V1 representations. The experimenters suggest that this finding may be explained by positing that "the very act of attempting to generate mental imagery interferes with [the] aphantasics' ability to form […] sensory representations" (Cabbai et al., 2024, p. 13). This suggestion falls in line with evidence from another recent fMRI study (Meng et al., 2023), where the V1 activity in aphantasics who were instructed to visualize grated patterns could not be cross-decoded[6] from that occurring during perception of the relevant patterns (but see Weber et al., 2023 for evidence of cross-decodability in aphantasics' V1 in a

[5] In binocular rivalry tasks, different images are presented to each eye. Instead of experiencing a composite of the two images, the visual experience alternates quickly between the two images. If visualizers are presented with a red and a green image, visualizing a red image prior to the task primes their visual experience, as evident by them reporting to see the red image first more often (Pearson, 2014). This priming effect is absent in aphantasics, suggesting that aphantasia occurs at the sensory level (Keogh & Pearson, 2018).

[6] Cross-decodability between V1 activation during visualization and perception is one of the hallmarks for depictive representations (Naseralis et al., 2015; Pearson & Kosslyn, 2015).

similar task but without visualization instructions). Furthermore, the inability to form voluntary mental imagery explains the absence of priming effects in binocular rivalry tasks, where aphantasics are instructed to visualize.

The converging evidence thus suggests that while aphantasics seem to be able to generate *involuntary* unconscious mental imagery$_R$, they nonetheless fail to generate *voluntary* unconscious mental imagery$_R$. However, as Blomkvist (2023) points out, the aphantasics' ability to produce involuntary unconscious mental imagery$_R$ does not suffice to account for their competency on voluntary mental imagery tasks. For example, the experimenter in a visual memory study (Jacobs et al., 2018) for which Nanay (2021) suggests an aphantasic used unconscious mental imagery, instructed their participant to visualize, meaning that, according to the empirical evidence on voluntary visualization in aphantasics (Cabbai et al., 2024; Meng et al., 2023), we should, contrary to Nanay's prediction, not expect her to have generated (unconscious) mental imagery$_R$. This prediction is further strengthened by evidence from another visual memory study (Bainbridge et al., 2021), where aphantasics reported to be utilizing non-visual strategies, such as relying on symbolic and spatial representations (similar evidence is provided by mental rotation studies [Crowder, 2018; Pounder et al., 2022; Zeman et al., 2010]; more on this in Sections 4.1-2 below).

In conclusion, while aphantasics seem to be able to generate involuntary (i.e., spontaneous) unconscious mental imagery$_R$, the evidence suggests that for tasks where they are instructed to visualize, the very attempt may impede their ability to form mental imagery$_R$, which may be explained by their tendency to use *alternative non-visual-imagery-based strategies* to solve the tasks in question. Therefore, their performance on voluntary imagery tasks cannot be explained via unconscious mental imagery$_R$, meaning that ARS fails to account for the aphantasics' competency (at least with respect to voluntary imagery tasks) and thus fails to resolve the PAC.

4. The Visualizer's Fallacy

Having rejected both AES and ARS as possible strategies of accounting for the PAC, I now temporarily take a step back from the PAC to consider a new puzzle of aphantasia, which I refer to as the *puzzle aphantasia skepticism* (PAS).

> *Puzzle of Aphantasia Skepticism* (PAS): Why are visualizers so reluctant to the idea that aphantasics do not have mental imagery$_{E/R}$[7] when they solve imagery tasks?

Note that the PAS is not the puzzle of whether aphantasics have mental imagery$_{E/R}$ when they solve imagery tasks; this question has already been answered in the negative above. Instead, the PAS is concerned with the question of what led visualizers (scientists and laypeople alike) to the assumption that aphantasics have mental imagery$_{E/R}$ during task performance in the first place. That is, the PAS is a puzzle regarding the underlying *logic* that leads one to take the position of AES or ARS. In what follows, I will propose that the PAS can be solved by positing that AS arises due to a bias caused by the visualizer's own imagery experience, which leads them to falsely assume that mental imagery$_{E/R}$ is necessary for the performance of mental imagery tasks.

4.1 Introducing the Visualizer's Fallacy

To address the PAS, I will consider two types of tasks that are generally understood to test for (visual) mental imagery, namely mental rotation tasks (MRTs; Shepard & Metzler, 1971) and visual information tasks (Behrmann et al., 1984).

In classic MRTs, participants are asked whether three-dimensional figures depicted next to a target figure are the same figure as the target, only rotated (Shepard & Metzler, 1971). Since the reported strategy of solving MRTs consists of forming (and then rotating) a visual mental image of the figure (Richardson, 1999; Shepard & Cooper, 1982), aphantasics were not expected to be able to carry out the task (Zeman et al., 2010). However, as a range of studies (Crowder, 2018; Pounder et al., 2022; Zeman et al., 2010) show, aphantasics can solve MRTs and, although taking slightly longer than visualizers to do so, even give correct answers more often than visualizers do (Kay et al., 2024).

Visual information tasks involve questions about the visual details of objects, such as object shape (e.g., whether an animal's ears are "floppy or upright" [Behrmann et al., 1984, p. 1078]), or (relative) object color (e.g., "Is the green of grass darker than the green of a pine tree?" [Zeman et al., 2010, p. 147]). Solving these information tasks, just as in the case of MRTs, is usually experienced as an act of generating and manipulating a mental image. Kosslyn, for example, states that when one is asked about the shape of a cat's ear, one "visualize[s] a cat's head and examine[s] the shape of its ear," by "shifting the attention window over [the mental image]" (Kosslyn et al., 2006, p. 144). However, despite their inability to voluntarily form mental images, let alone inspect them, aphantasics can solve these types of visual information tasks (Liu & Bartolomeo, 2023; Milton et al., 2021).

The following pattern emerges: Visualizers falsely believe that aphantasics cannot solve a certain task (MRT, visual information, etc.) during the performance of which visualizers have mental imagery$_E$. However, the mere observation that one has mental imagery$_E$ when carrying out a task does not, by itself, suffice to derive the conclusion that aphantasics should not be able to solve the task in question. To derive this conclusion, the visualizer must assume that mental imagery$_E$ is *necessary* to solve the task. I refer to this assumption as *imagery$_E$ essentialism*.

> *Imagery$_E$ essentialism*: competency → mental imagery$_E$[8]

[7] 'Mental imagery$_{E/R}$' here means 'mental imagery$_E$ or mental imagery$_R$,' thus making the PAS refer to proponents of both AES and ARS, depending on which imagery component one focuses on.

[8] This is to be read as 'if an agent has the competency to solve visual mental imagery tasks, then they have mental imagery$_E$.'

Imagery$_E$ essentialism, when confronted with the finding that aphantasics can solve mental imagery tasks, directly leads to AES. For the aphantasic's claim that she, despite her competency, does not have mental imagery$_E$, which contradicts imagery$_E$ essentialism, must be explained away by positing that she does not *really* lack mental imagery$_E$ but merely interprets/describes her mental imagery$_E$ differently. Thus, AES arises due to imagery$_E$ essentialism, which itself originates from the visualizer's bias towards their own experience during task performance.

Proponents of ARS, on the other hand, do not endorse imagery$_E$ essentialism. In fact, they can explain the aphantasic's competency by positing that the proponent of AES falsely attributes causal relevancy to the experience-component of mental imagery (mental imagery$_E$), whereas the real heavy lifting is being done by the underlying representations (mental imagery$_R$), which do not have to be accompanied by a corresponding imagery experience.

However, proponents of ARS are also biased by their own experience, only in a slightly more indirect manner. This is so because they take mental imagery$_E$ to be caused by mental imagery$_R$, meaning that mental imagery$_E$ implies mental imagery$_R$ (e.g., when one has the experience of seeing a cat in their mind's eye, then this implies that they have a cat-shaped representation in their early visual cortex). Thus, when they experience mental imagery during task performance, they might not attribute causal relevancy to the experience itself, but they take the experience to be an indicator for the presence and importance of the underlying neural representation (mental imagery$_R$). Thus, while the experience of mental imagery directly biases the proponent of AES towards assuming the necessity of mental imagery$_E$, the same experience indirectly biases the proponent of ARS towards the importance of mental imagery$_R$, leading them to their own essentialist assumption:

Imagery$_R$ essentialism: competency → mental imagery$_R$

Thus, AES and ARS arise due to an essentialist assumption about the importance of different imagery components (mental imagery$_E$ and mental imagery$_R$ respectively). It is this essentialist assumption, resulting from the visualizer's experience, which I coin the *visualizer's fallacy*.

> *Visualizer's Fallacy*: The false belief, caused by the visualizer's own experience, that mental imagery$_{E/R}$ is necessary to perform mental imagery tasks.

Thus, the PAS, namely the puzzle of why visualizers are so reluctant to the idea that aphantasics do not have mental imagery$_{E/R}$ when solving imagery tasks, can be resolved by positing that the visualizer's own imagery experience during task performance biases them towards assuming that their own *strategy* is necessary to solve the task. And the only difference between AES and ARS is that they attribute the causal power of this strategy either to the mental imagery experience itself (in the case of AES) or to the underlying depictive representations (in the case of ARS).

4.2 Alternative Cognitive Strategies

Let us now return to the PAC, which poses the puzzle of how aphantasics can solve mental imagery tasks. AES and ARS attempt to resolve this puzzle by positing that aphantasics have mental imagery. However, as we have seen in Sections 3.1-2, this claim does not hold up in the face of the empirical evidence. The failure of AES and ARS, I have argued, results from the visualizer's fallacy, which boils down to the claim that there is only one possible strategy to solve imagery tasks, namely to form and manipulate (un)conscious imagery.

However, another possible strategy of addressing the PAC is to posit that aphantasics simply use *alternative cognitive strategies*. For example, it has been suggested that aphantasics might solve MRTs by "match[ing] individual blocks and angles perceptually" (Zeman et al., 2010, p. 152). Another suggestion is that they use spatial, instead of object, imagery (Crowder, 2018; Pounder et al., 2022). This suggestion is especially interesting because it has been argued that even visualizers only make use of spatial imagery when solving MRTs, meaning that their accompanying (object) imagery experience may be misleading (Liesefeld & Zimmer, 2013; see also Pylyshyn, 2002 for a similar claim). Furthermore, aphantasics do not only report to possess intact spatial imagery abilities (Dawes et al., 2020) but were also found to excel at recalling the spatial layout of rooms they have seen in pictures, when later asked to draw them from memory (Bainbridge et al., 2021).

There is also evidence that aphantasics use symbolic and verbal strategies, such as applying labels to points in space. For example, in the aforementioned visual memory study (Bainbridge et al., 2021), aphantasics used written labels to scaffold their memory when making their drawings and reported to be using "verbal strategies" (p. 168). These findings suggest that aphantasics may make use of what Pylyshyn (2001, 2002) referred to as *visual indexing*, a mental strategy by which one attaches verbal labels (e.g., "chair") to locations within egocentric space. As Pylyshyn points out, this strategy "assumes no pictorial properties of [a] 'superimposed image'" (Pylyshyn, 2002, p. 169).

Lastly, the reports of some aphantasics seem to point towards the importance of motor imagery, namely the simulation or rehearsal of bodily movements (Jeannerod, 1994; Lotze & Halsband, 2006). For example, when asked to mentally count the number of windows in their house, a task for which visualizers likely would generate images of the rooms, one aphantasic reported that they "sort of fly through the house and inspect every room for the 'idea' of window," (Zeman, 2020, p. 700), thus suggesting that their strategy involves generating imaginary (body) movement based on their memory of the spatial layout of their house. Another participant reported that when they represent objects they do so by "being the object" (ibid, p. 701), thus seemingly pointing towards a proprioceptive representational strategy.

In conclusion, the strategy of positing that aphantasics use alternative strategies to solve mental imagery tasks seems to be a promising candidate for the solution to the PAC. While it may seem somewhat unsatisfactory to simply posit that aphantasics are doing 'something other than what visualizers do,' it is nonetheless an important improvement over the suggestion that they are doing 'the same thing as visualizers are doing,' which lies at the heart of the visualizer's fallacy, as well as AER and ARS. With respect to the question of *what* aphantasics are doing, preliminary evidence seems to suggest that they use a mix between verbal labels, semantic memory, spatial imagery, motor imagery and proprioception. Future empirical and theoretical work should thus aim to tease out the different non-visual-imagery-based strategies (and their possible interactions and scaffolding relations) aphantasics appear to be using to solve visual mental imagery tasks.

5. Implications of the Visualizer's Fallacy

In this final section, I will consider three potential adverse effects that the prevalence of the visualizer's fallacy might have for the mental health of aphantasics, as well as for our views of the dynamics of cognition in general.

The first adverse effect is that the experience of aphantasics may be disregarded. That is, aphantasics who use non-visual strategies to solve tasks for which visualizers use (visual) mental imagery, may encounter disbelief when sharing their experience (as was the case for Faw [2009]). This social rejection may cause the aphantasic distress or may lead to social isolation, discouraging them to share their experience with others, or making them question their own experience.

While the potential disbelief mostly impacts aphantasics who know about their own condition and are already somewhat aware of their own strategies, it should be noted that many aphantasics do not even notice their inability to visualize for decades into their life (Zeman et al., 2015; 2020), stating that they assumed that talk of 'visual mental images' and 'visualization' are merely metaphorical (see e.g., Fox-Muraton, 2021). [9] For these people, suddenly finding out that they lack an ability which the majority of the general population possesses can represent a stressful life event and may lead to adverse effects, such as self-doubt and feelings of inferiority (Monzel & Vetterlein, 2023). Crucially, while these people may have previously not considered themselves impaired in any way, finding out about aphantasia may suddenly lead them to consider themselves impaired with respect to other domains, such as learning, orientation and creativity. One potential contributing factor for this tendency may be the prevalence of the visualizer's fallacy. For when an aphantasic internalizes the visualizer's fallacy, this may lead them to suspect that they cannot carry out mental imagery tasks. Thus, the second possible adverse effect of the prevalence of the visualizer's fallacy may be an amplification of the distress experienced by people who just found out that they are unable to voluntarily generate visual mental imagery. Furthermore, the feeling of limitation due to the inability to form visual mental imagery might blind the aphantasic to the utility of alternative strategies which she is *already* using, without having given them much thought prior. That is, the very belief that mental imagery is necessary to carry out a certain task might interfere with the possibility of exploring and nurturing alternative strategies, thus leading to an actual decline in the aphantasic's abilities. Thus, the false belief to be impaired, amplified by the internalization of the visualizer's fallacy, may become a self-fulfilling prophecy.

Thirdly, the visualizer's fallacy may also be harmful for our view of the dynamics of cognition in general, since the presumed limitation to one viable strategy to solve a whole range of tasks, including MRTs, visual information tasks, visual memory tasks, etc., represents an impoverished view of our general cognitive skill set. In all likelihood, the strategies used by aphantasics are not inaccessible to the visualizer either, meaning that even though the visualizer may have a different go-to strategy, the potential for alternative strategies may already lay dormant within her. Thus, exploring the alternative strategies which aphantasics use to solve imagery tasks can highlight the multiple ways and formats in which information can be represented in general. Especially the exploration of possible interactions of multiple representational strategies may lead to a better understanding of the cognitive profiles of individuals, which, in turn, might lead to the development of new educational tools and methods tailored to the individual cognitive profiles (i.e., the preferred representational strategies) of children. Thus, by combating the visualizer's fallacy and investigating the alternative strategies used by aphantasics, we may enrich our understanding of the dynamics of cognition in general.

6. Conclusion

The visualizer's fallacy is the false belief that mental imagery is necessary for visual imagery tasks. This belief, which is caused by the visualizer's own experience, when confronted with the finding that aphantasics can perform imagery tasks, may lead to aphantasia skepticism, namely the assumption that aphantasics have mental imagery, be it in experiential or representational form. This assumption, which does not hold up to the empirical evidence, may lead aphantasics to feel alienated from their visualizing peers and may make them question their own abilities. Furthermore, it leads to an impoverished view of the variability and dynamics of our cognitive tools. Combating the visualizer's fallacy and aphantasia skepticism therefore not only leads to a better understanding and acceptance of aphantasics but may also provide us with new insights into our own cognitive skill set.

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[9] The finding that many aphantasics did not even notice their inability to visualize for decades should be taken as another strong indicator for the overestimation of the importance of the ability to visualize for our general cognition and mental wellbeing.

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