DOI: 10.1111/nous.12551

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Aphantasia reimagined

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Abstract

How is it that individuals who deny experiencing visual imagery nonetheless perform normally on tasks which seem to require it? This puzzle of aphantasia has perplexed philosophers and scientists since the late nineteenth century. Contemporary responses include: (i) idiosyncratic reporting, (ii) faulty introspection, (iii) unconscious imagery, and (iv) complete lack of imagery combined with the use of alternative strategies. None offers a satisfying explanation of the full range of first-person, behavioural and physiological data. Here, I diagnose the puzzle of aphantasia as arising from the mistaken assumption that variation in imagery is well-captured by a single 'vividness' scale. Breaking with this assumption, I defend an alternative account which elegantly accommodates all the data. Crucial to this account is a fundamental distinction between *visual-object* and *spatial* imagery. Armed with this distinction, I argue that subjective reports and objective measures only testify to the absence of visual-object imagery, whereas imagery task performance is explained by preserved spatial imagery which goes unreported on standard 'vividness' questionnaires. More generally, I propose that aphantasia be thought of on analogy with agnosia, as a generic label for a range of imagery deficits with corresponding sparing.

1 INTRODUCTION

No-one would propose that our powers of perception lie on a single scale. Humans vary across their senses; some of us are eagle-eyed, others owl-eared, others rat-nosed. And characterising any individual sense is enormously complex. Take vision. Humans range in their contrast sensitivity, light sensitivity, depth perception and visual field characteristics. The surface area of early visual cortex varies ~2.5-fold among neurotypical individuals, yielding significant differences in size perception and spatial acuity (Dougherty et al., 2003; Schwarzkopf et al., 2011; Song et al., 2015). Moreover, someone might have excellent vision in all the above respects yet be severely impaired in perceiving faces (prosopagnosia), motion (akinetopsia), colour (achromatopsia) or shape (visual form agnosia).

Imagery is the echo of perception. Not only is there imagery corresponding to each modality. But researchers have long distinguished multiple components of imagery: both processes, such as generation, inspection and transformation (Kosslyn, 1980; Farah, 1984); and contents, for instance: visual versus motor imagery (Sirigu & Duhamel, 2001), or visual-object versus spatial imagery (Farah et al., 1988; Kozhevnikov et al., 2005). Variation in visual cortical surface area also correlates with imagery strength and precision (Bergmann et al., 2016).

Despite this, discussions of individual differences in imagery commonly operate under the assumption that variation lies on a single 'vividness' scale, with 'high' imagers at one end, and 'low' imagers at the other. Here, I explain how this assumption underpins puzzlement perennially associated with aphantasia, or 'lack of a mind's eye'. Relieved of the assumption, I defend an account of aphantasia on which it most commonly reflects partially preserved imagery which is missed or unreported on standard measures. I thereby resolve the puzzle of aphantasia, replacing it with a richer appreciation of our individual differences.

Section 2 introduces the puzzle of aphantasia, namely the striking lack of correlation between absence of reported imagery and performance in standard imagery tasks. Section 3 critically reviews four contemporary accounts of aphantasia: (i) idiosyncratic reporting, (ii) faulty introspection, (iii) unconscious imagery, and (iv) complete lack of imagery combined with the use of alternative strategies. None offers a satisfying explanation of the full range of first-person, behavioural and physiological data. Section 4 criticizes the standard tool for diagnosing aphantasia, the Vividness of Visual Imagery Questionnaire (VVIQ), and the corresponding assumption that our powers of imagery lie on a single 'vividness' scale. Breaking with this assumption, a crucial distinction between visual-object and spatial imagery is reviewed. Section 5 then elaborates and defends an alternative account of aphantasia, first proposed by Blazhenkova and Pechenkova (2019), showing how it elegantly accommodates all the data. On this account, preserved performance in many aphantasics reflects preserved spatial imagery, whereas subjective reports and objective measures of aphantasia testify to the genuine absence of visual-object imagery. Section 6 concludes.

2 THE PUZZLE OF APHANTASIA

Though sometimes described simply as the "inability to visualise" (Keogh & Pearson, 2024: 27), aphantasia is most commonly characterized as the absence (or near absence) of *voluntary, wakeful* imagery.[1] Around 1–4% of the general population is aphantasic (Betts, 1909; Faw, 2009; Dance et al., 2022; Beran et al., 2023).[2] I consider myself (visually) aphantasic; perhaps so do you.

Why is aphantasia puzzling? Not because of the mere fact of individual variation. As Bain comments on Galton's pioneering studies: "That certain individuals … have a great or a small visualising memory … contributes nothing new to science; the existence of such variations has been known at all times." (1880: 566)[3] Instead, what scientists and philosophers have consistently found "startling and paradoxical" (ibid: 564) is that subjects who deny having visual imagery nonetheless perform normally on tasks presumed to require it. This is why Galton is "amazed" when to "his astonishment … the great majority of the men of science" whom he questions "protested that mental imagery was unknown to them" (1880: 302) yet "can nevertheless give life-like descriptions of what they have seen, and … otherwise express themselves as if they were gifted with a vivid visual imagination," even becoming "painters of the rank of Royal Academicians" (1880: 304).[4]

To develop the puzzle of aphantasia, let us first consider how aphantasia is diagnosed, and then studies of performance.

Diagnosis. From Galton onwards, self-report questionnaires have been "the gold standard tool used to measure visual imagery" (Pearson, 2020: 176). Galton employed a "breakfast table questionnaire," where subjects were asked to "think of some definite object," such as their morning's breakfast table, and "consider carefully the picture that rises before [their] mind's eye" (1880: 21). Questions followed about illumination, definition and colouring, and miscellaneous further items concerning imagery, memory, and aptitude (Galton, 1883).

Early critics complained about the questionnaire's narrowness (Bain, 1880). Betts (1909) constructed a more comprehensive Questionnaire upon Mental Imagery (QMI), comprising 150 items: forty pertaining to visual imagery; twenty to each of five other modalities (auditory, cutaneous, kinaesthetic, gustatory, olfactory); and ten to organic imagery (i.e., bodily sensation). Using factor analysis, Sheehan (1967) pared this down into a more practical 35 item questionnaire. Finally, Marks (1973) incorporated four of Sheehan's items into a new 16 item questionnaire specific to visual imagery: the Vividness of Visual Imagery Questionnaire (VVIQ). The VVIQ has since been used in thousands of studies and taken by over a million people online. It is the "most

[1] Zeman et al., 2015: 379; Zeman, 2024: 468; Pearson, 2019: 624; Pounder et al., 2022: 180. The reason for the qualification is that many aphantasics report visual dreams, and some involuntary, wakeful imagery (Zeman et al., 2015, 2020; Brain, 1954, Case II). This has led to speculation that aphantasia specifically reflects a deficit of top-down imagery generation (e.g., Dijkstra et al., 2019; Milton et al., 2021; Whiteley, 2021; though for trenchant criticism, see Krempel & Monzel, 2024). This picture is complicated by evidence that visual dreams are impaired in aphantasia. Thus, Dawes et al. (2020; also, Beran et al., 2023) find that aphantasics report less frequent dreams with more semanticized content than controls, but (consistent with the account defended below) no difference in spatial complexity; and Knowles et al. (2021) find only a third of their group of acquired aphantasics report fully preserved visual dreams (cf. Brain, 1954, Case I). Insofar as aphantasics differ in their involuntary and dream imagery, this is simply further reason to hold that aphantasia labels a range of varied imagery deficits as urged below. For more on definitions, see Blomkvist, 2023: §2 and Jin et al., 2024: §3.

[2] Such estimates depend dramatically on methodology and criterion, e.g., whether only visual imagery is considered, whether self-identification or questionnaire scores are used, and whether complete absence of imagery is required.

[3] If anything, such variation is currently overestimated. Surveying students, Blazhenkova et al. (2024) report estimates that ~1/3 of the population have aphantasia and ~1/2 hyperphantasia (i.e., extremely vivid imagery).

[4] Likewise, reporting two cases of acquired aphantasia, Brain comments: "Perhaps the most surprising feature is how little the loss of voluntary visualization impaired functions in which visual imagery might have been expected to play some part." (1954: 290)

commonly used questionnaire" in the field (Pearson, 2020: 176) and "the diagnostic tool used to identify individual cases of aphantasia ... in all recent studies" (Jacobs et al., 2018: 63).

The VVIQ comprises sixteen items in four groups. For each group, subjects are asked to picture a scene. For example: "Visualise a rising sun. Consider carefully the picture that comes before your mind's eye." They then rate their imagery in response to four prompts on a 5-point scale:[5]

1. 'No image at all, you only "know" that you are thinking of the object'
2. 'Vague and dim'
3. 'Moderately clear and vivid'
4. 'Clear and reasonably vivid'
5. 'Perfectly clear and as vivid as normal vision'

A single numerical score from 16–80 results. No-one agrees how low a score indicates aphantasia. Zeman et al. (2015) distinguish two aphantasia subgroups, "no imagery" (VVIQ = 16) and "minimal imagery" (VVIQ = 17–30). However, since one self-identifying aphantasic in Zeman et al.'s study scored 32, Keogh and Pearson (2024) consider VVIQ = 16 and VVIQ = 17–32 subgroups. Zeman et al. (2020) distinguish "extreme" (VVIQ = 16) and "moderate" (VVIQ = 17–23) aphantasia, but report combined data. Milton et al. (2021) and Bainbridge et al. (2021) adopt single cut-offs of 23 and 25 respectively, without further distinction.

Performance. How do VVIQ scores correlate with performance in objective tests of imagery? The familiar answer is: Poorly. As Dean and Morris write: "little or no correlation has been found between measures based upon subjective reports of the conscious experiences of imagery and experimental tasks or spatial tests that are explained in terms of their use or manipulation of mental images" (2003: 246).[6] Current intense interest in aphantasia confirms this picture. Consider two important recent studies of visuo-spatial cognition and visual working memory, respectively.

Pounder et al. (2022) compared performance between aphantasics (VVIQ $\leq$ 25) and controls (VVIQ $\geq$ 35) on five tasks. Three traditionally thought to draw on visual imagery are of particular interest.[7] In the Spatial Span task (Fig. 1A), subjects watch a display of white boxes sequentially change color before reproducing the sequence by tapping the boxes in turn. By far the most common strategy involves "linking targets ... with imaginary lines" (Patt et al., 2014: 198). In the classic Mental Rotation task (Fig. 1B), subjects determine whether two 3D shapes are rotations of one another. Response time increases linearly with rotation angle, corroborating subjective reports of mentally rotating the shapes (Shepard & Metzler, 1971). In the One Touch Stockings of Cambridge task (Fig. 1C), like the well-known Tower of Hanoi puzzle, subjects calculate 'in their heads' the minimum number of moves required to rearrange three coloured balls hanging in 'stockings' into a displayed arrangement. Subjects report moving the balls in their minds' eyes.

Pounder et al. found that aphantasics performed comparably to controls across all three tasks. In the Spatial Span task, there was no difference in total or box usage errors. In the Mental Rotation task, aphantasics exhibited the same pattern of accuracy and latency at different angles as

[5] I have reversed the original scale so that high scores report more vivid imagery, as in Marks, 1995 and Zeman et al., 2015. The wording in Zeman et al.'s (2015) revision and found online slightly differs, e.g., "vivid" is replaced by "lively," and "normal vision" by "real seeing".

[6] See references therein. For review and philosophical commentary, see: Thomas, 2001, 2021; Schwitzgebel, 2011; Phillips, 2014; Nanay, 2021; Arcangeli, 2023; Blomkvist, 2023, 2025; Lorenzatti, 2023; Michel et al., 2025.

[7] Their other two tasks were of Verbal Recognition Memory and Pattern Recognition Memory. In neither was any difference in performance observed.

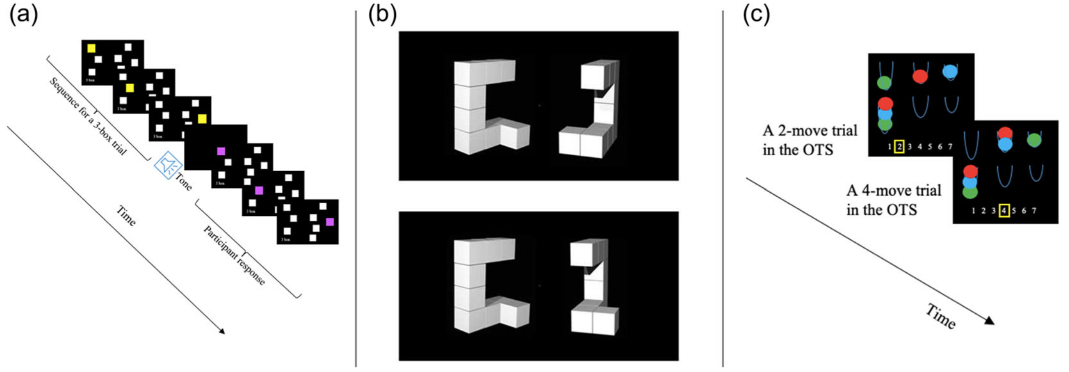

FIGURE 1 Imagery tasks from Pounder et al., 2022. A: Spatial Span. Participants watch a display of white boxes sequentially change colour before reproducing the sequence. B: Mental Rotation. Participants determine whether pairs of shapes are rotations of each other (top) or not (bottom). Stimuli for illustration only. C: One Touch Stockings of Cambridge. Participants determine the moves required to move three coloured balls at the bottom of the display into the arrangement at the top. 1A and C reprinted from Pounder et al., 2022: 184, Figure 1, © 2022, with permission from Elsevier. 1B reprinted from Ganis & Kievit, 2015, licensed under CC BY 4.0, https://creativecommons.org/licenses/by/4.0. [Color figure can be viewed at wileyonlinelibrary.com]

controls. And in the One Touch Stockings task, there was no difference in accuracy, although aphantasics were somewhat slower as task difficulty increased. Pounder et al. re-analysed their data looking only at severe aphantasics (VVIQ = 16). Again, they found no significant differences with controls, although performance on the Mental Rotation task was slower. As Pounder et al. conclude: "the cognitive profile of people without imagery does not greatly differ from those with typical imagery" (2022: 180).

Keogh et al. (2021) found that aphantasics (VVIQ < 32) performed as well as controls on a variety of visual working memory tasks. However, they attributed this pattern to non-visual strategies. This is plausible since, in their tasks, unmasked stimuli were presented for 1000 or 1500ms, allowing up to 2s (including iconic memory) for non-visual encoding. To block such strategies, Knight et al. (2022) compared performance in severe aphantasics (VVIQ = 16) with controls in a specially designed task. In this, a randomly orientated Gabor patch (a simple, circular visual stimulus made up of alternating light and dark stripes) was presented for just 250ms, then masked. After a 9s delay, subjects reported the Gabor's orientation. In interrupted trials (50%), they were presented with a dot matrix task in which they had to encode a sequence of dots in a grid, and only then report the Gabor's orientation. Contrary to expectations, Knight et al. found "no significant differences between imagery groups" across all tasks and conditions, despite this being "a task specifically designed to prevent [non-visual] compensation". As they conclude: "aphantasics … appear normal"; "it is unclear how" (2022: 1809).[8]

This then is our puzzle: How is it that subjects reporting little or no imagery on the VVIQ nonetheless perform remarkably like controls in standard tasks widely presumed to rely on mental imagery? Notice that the puzzle is not that there are no performance differences in aphantasia. Small differences were observed above. Moreover, even if large differences were found in other tasks, it would still need explaining how aphantasics perform so similarly to controls on the kinds of tasks just mentioned.

[8] Weber et al. (2024) replicate these behavioural results in a very similar task.

It is widely claimed that aphantasics *do* exhibit longer-term memory deficits, especially in autobiographical and scene memory.[9] Aphantasics commonly report "difficulties with autobiographical memory" (Zeman et al., 2015: 379; Dawes et al., 2020; Zeman et al., 2020). Compared to controls, they provide less detail when probed about recent and distant events, as well as when describing future and counterfactual scenarios (Milton et al., 2021; Dawes et al., 2022). They also draw significantly fewer and less detailed objects when sketching photographs of scenes from memory but not when copying (Bainbridge et al., 2021) and offer 30% less information in an eye-witness memory task (Dando et al., 2023). Finally, harder tasks suggest deficits which extend beyond autobiographical memory (Monzel et al., 2022).

However, the tasks just reviewed all employ biased measures, and so may equally reflect a reluctance in reporting or drawing (or other strategic difference between groups) as opposed to an absence of underlying information (cf. Michel et al. 2025: 8).[10] A red flag in Bainbridge et al.'s study is that aphantasics were much less likely than controls to draw objects which were *not* in the original scene. This lower false alarm rate is indicative of conservative response bias. This may misleadingly suggest an underlying difference in memory representations when none in fact exists. The jury thus remains out as to whether memory abilities distinguish aphantasics.[11] But since such differences, if genuine, would not remove the puzzle of aphantasia, I set them aside here.[12]

3 | STANDARD ACCOUNTS

How should we respond to the puzzle of aphantasia? Lorenzatti (2023) and Zeman (2024) review four accounts: (i) idiosyncratic reporting, (ii) faulty introspection, (iii) unconscious imagery, and (iv) complete lack of imagery. Views (i)-(iii) are *imagery* accounts; they address the puzzle by denying that imagery is absent. View (iv) is a *no imagery* account; it takes subjective VVIQ reports at face value.

[9] This motivates Blomkvist's (2023) theory of aphantasia as a malfunction of episodic memory retrieval.

[10] The issue is an old one. For example, McKelvie and Demers (1979) argue in support of the validity of the VVIQ based on the superiority of high scoring visualizers in various free-recall tasks. However, the fact that their two groups performed equally well in recognition tests suggests the difference may have reflected differences in response criteria as opposed to underlying memory strength.

[11] Michel et al. (2005: 8) claim that "forced-choice memory tasks … show that aphantasics do encode the relevant memories," citing Pounder et al. (2022), Milton et al. (2021) and Siena and Simons (2024). However, their case is far from decisive. First, the three cited papers contain very little probative data: Siena and Simons do not use a forced-choice task; data from Milton et al.'s one forced-choice test (Warrington's Recognition Test for words and faces) confronts a ceiling effect in the word component (with scores of 98+% across groups); and Pounder et al.'s verbal recognition data was not analysed because of a similar ceiling effect (2022: 185). Second, as pointed out by Blomkvist (2025), tasks employing only delays of seconds to minutes cannot be assumed to generalize to longer-term episodic memory. Nonetheless, the fact that no differences were found between aphantasics and controls across these varied tasks does suggest that short-term memory deficits in aphantasia are at most modest.

[12] If short- and long-term memory representations are affected in aphantasia, then the account defended below predicts partial sparing of spatial memories. There is evidence of this. In Bainbridge et al. (2021), aphantasics were just as good as controls at placing objects correctly and drawing their sizes accurately. And Dawes et al. (2020) found that aphantasics reported no impairment in spatial memory despite impairments on all other memory components. If short- and long-term memory representations are not affected, various possibilities arise. One is that aphantasics are impaired in generating visual-object imagery based on such representations, and that this explains impairments in recall despite preserved recognition, where such representations are activated by perception.

To explain preserved performance in classic imagery and visual working memory tasks, proponents of no imagery accounts appeal to alternative, non-imagistic strategies (e.g., verbal encoding). There is evidence that such strategies are exploited in certain tasks. Keogh et al. (2021) compared aphantasics and controls in a visual working memory task requiring the recall of a Gabor patch's orientation. Overall patterns of data were very similar between groups. However, aphantasics gave significantly lower ratings to the following questionnaire item: "To remember the visual patterns I tried to imagine the images in my mind until the test image came up." (241) Consistent with this, aphantasics (unlike controls) failed to exhibit an oblique effect—a standard finding whereby cardinal orientations are better discriminated and remembered than oblique orientations. This suggests that aphantasics adopted a non-visual strategy (e.g., remembering the orientation via a label such as "two o'clock" or "60 degrees"). Also notable is Zeman et al.'s (2010) finding that acquired aphantasic patient, MX, performed worse on a visuospatial (Brooks matrix) task under articulatory suppression (repeatedly saying "the" aloud) but not under spatio-motor suppression (pattern tapping). This is the reverse of the normal pattern, and suggestive of a verbal strategy.

However, non-visual strategies struggle to explain all task performance in aphantasia. As we saw, in Knight et al.'s (2022) visual working memory study, non-visual encoding was deliberately prevented, yet performance preserved. Weber et al. (2024) provide corroborating physiological evidence, showing that memorized stimuli (again, oriented Gabors, presented briefly and heavily masked) could be decoded equally well from early visual areas in aphantasics and controls, and moreover that decodable information correlated closely with performance. These results are not predicted by verbal encoding accounts and strongly suggest that performance was mediated by imagistic representations.

Importantly, it cannot be concluded that these imagistic representations are the same as those used by controls. Chang et al. (2025) report that stimulus features which subjects were instructed to imagine could be decoded from early visual areas in both aphantasics and controls—again, suggesting the presence of imagistic representations. However, they report major differences across groups, with aphantasics exhibiting more global responses (i.e., bilateral activations as compared to controls' lateralized responses) which failed to support generalization to perception (unlike controls). This suggests a difference in content or format. Equally, we cannot conclude that the representations are distinctively visual, as opposed to cross-modal or amodal. For instance, Vetter et al. (2014) found that subjects who heard or imagined different categories of sounds while blindfolded exhibited decodable activity in early visual cortex.

Another compelling data point comes from Zhao et al. (2022) who tested MX on a mental letter rotation task. No behavioural differences were found with controls either in accuracy or reaction time pattern. But crucially, MX also exhibited an electrophysiological signature of spatial mental rotation, the so-called rotation-related negativity (RRN; Heil 2002), an EEG component located in the posterior parietal cortex. This strongly suggests that MX used imagistic spatial transformations like controls.[13]

[13] Zhao et al. also tested MX with mirror-reversed as opposed to canonical letters. Again, he was highly accurate (90+%) and showed a similar response time pattern (albeit faster than controls). However, no RRN was observed. Zhao et al. conclude that MX used a different strategy in this condition. This would not detract from the point in the text which is simply that aphantasics sometimes use imagery-based strategies. However, it is also possible that MX did use imagery but that increased variability in initiating rotation on mirror-reversed trials led to the averaging out of the ERP signature across trials. Reason to suspect this comes from Heil (2002) who observed postponement of rotation and a delayed RRN in more difficult trials (which mirror-reversed letters constitute).

In sum, there is good reason to think that (at least some) imagery is present in aphantasia. Why then is it not reported? This takes us to the three *imagery* views.

On the first, aphantasics are *idiosyncratic* in reporting their imagery. This view should not be dismissed lightly. As Kaufmann observes in a classic critique of the VVIQ: "Lacking an objective frame of reference, one is faced with a highly ambiguous task, and is given large room for subjective interpretations. … Similar mental experiences may be given highly varying values by different subjects, due to different subjective conceptions of the task and of the rating scale" (1981: 22; also, Flew, 1956; Thomas, 2001).

However, it is doubtful that aphantasia primarily reflects idiosyncratic reporting. One specific reason is that many aphantasics *do* possess a frame of reference, namely their imagery in non-visual modalities. To take my own (not at all unusual) case, I have a perfectly good 'mind's ear' and would report reasonably vivid auditory imagery on auditory equivalents of the VVIQ, e.g., the Vividness of Auditory Imagery Scale (Brett & Starker, 1977) or Auditory Imagery Scale (Gissurarson, 1992). There is a clear contrast between my mind's ear and mind's eye; I lack something visually which I have auditorily. A proponent of the idiosyncratic reporting account must hold that subjects with differential profiles with respect to visual and other modalities of imagery are idiosyncratic in reporting visual but not other imagery. This seems quite arbitrary. If subjects have an appropriate enough concept of non-visual imagery to happily report it, why should they be deemed idiosyncratic if they claim that nothing at all like that occurs for them visually?[14]

Other imagery accounts appeal to faulty introspection (Schwitzgebel, 2011) or lack of conscious imagery. As Lorenzatti's (2023) discussion partly brings out, the distinctions between these views are vexed. Conceptually, we can distinguish between unintrospected imagery, unintrospectable imagery, unconscious imagery and subpersonal imagery, yielding four corresponding ways of thinking about aphantasia. However, these conceptual distinctions do not obviously all represent distinct metaphysical possibilities: Can conscious imagery be unintrospectable? Can unconscious imagery be personal level?[15]

Regardless, the idea that imagery might be present but not experienced or introspectively accessible is a longstanding one. Neisser (1970) proposes that we distinguish between "imagery as an experience" and "imagery as a process"—i.e., between phenomenally conscious imagery and functional imagistic representations.[16] Numerous authors have subsequently endorsed such a distinction in discussing aphantasia. Faw (2009) distinguishes between objective and subjective imagery (MI-1 and MI-2); Phillips (2014) distinguishes between experiential and representational imagery; Nanay (2018, 2021) distinguishes between conscious and unconscious mental imagery; and Michel et al. (2025) propose that we think of aphantasia as analogous to blindsight (see §4). These views all attempt to solve the puzzle of aphantasia by allowing that imagery is present to support performance, but denying it is introspectable/conscious to account for lack of report.[17,18]

[14] Lorenzatti (2023: 11) raises a similar style of objection to the idea that aphantasia involves faulty introspection. What explains why introspection only fails to track voluntary, wakeful imagery? Or only imagery in one modality? Or, we might add, imagery but not perception or emotion?

[15] Cf. Phillips (2014) on Schwitzgebel (2011).

[16] Partly prompted by his finding that performance in a geometric pattern memory task bore no correlation to reported imagery vividness (Sheehan & Neisser, 1969).

[17] Related proposals are found throughout the empirical literature, e.g., Botez et al., 1985; Siena & Simons, 2024. Jacobs et al. (2018: 62) float a more complex view on which single features (e.g., colour, shape) are represented unconsciously but not integrated object representations.

[18] Arcangeli (2023) distinguishes between mental imagery as a type of content and sensory imagination as a type of attitude, proposing that aphantasics are (mostly) individuals who lack sensory imaginative attitudes but nonetheless access mental

Imagery accounts are confounded by 'objective' measures of aphantasia (cf. Lorenzatti, 2023: 19f.). Kay et al. (2022) find that, unlike controls, aphantasic subjects do not exhibit a pupillary light response to imagined bright stimuli. Wicken et al. (2021) find that, unlike controls, aphantasic subjects show essentially flat-line galvanic skin (sweat) responses to frightening stories but not to pictures. And Keogh and Pearson (2018) use a binocular rivalry task to reveal an absence of imagery-based priming specifically in aphantasics. In binocular rivalry, different stimuli (e.g., a green horizontal patch and a red vertical patch) are presented to each eye. The perceptual system resolves the conflict by alternating between experience of one stimulus and the other. When control subjects are cued to imagine one of the stimuli before being presented with a rivalry display, they are significantly more likely initially to resolve the display in favour of the imagined stimulus. Aphantasics exhibit no such priming effect.[19]

Lack of imagery-based priming in aphantasics has also been observed in behavioural paradigms. When subjects had to imagine objects before searching for a picture of the object, Monzel et al. (2021) found that aphantasics exhibited a significantly lower priming effect than controls, suggesting that they were less able to use object imagery to speed their response. Consistent with this, Monzel and Reuter (2024) found significantly slower performance in aphantasics in a naturalistic, "Where's Wally/Waldo?"-type visual search task in which subjects searched for hidden objects in complex scenes. Again, this suggests that aphantasics were less able to guide visual search by imagining target objects.

These findings—lack of pupillary light responses, galvanic skin responses and imagery-based priming—are in no way predicted by imagery accounts.

Nanay (2021) seeks to accommodate these findings by claiming that specifically *voluntary* mental imagery does not prime rivalry in aphantasia. However, given that voluntary conscious imagery does prime rivalry in non-aphantasics we need some reason to accept this otherwise ad hoc conjecture. None is provided.[20]

Michel et al. (2025) seek to accommodate them by doubting whether "subjects with aphantasia followed the instructions" or chose to "engage imagery" where not "required by the task" (8). However, this is implausible on several grounds. First, story-induced imagery arises spontaneously. To avoid such spontaneous imagery, subjects in Wicken et al.'s study would need to have avoided reading the relevant text. But Wicken et al. made sure that their subjects did read and comprehend by checking that they could subsequently summarize story contents and excluding trials where they could not. Second, Kay et al.—explicitly anticipating Michel et al.'s objection—emphasize that aphantasic subjects exhibited a characteristic pupil size increase in relation to stimulus set size, indicating that they were fully engaged and on task, and not "'refusing' to actively participate in the task due to … a belief that they are unable to imagine" (2022: 8). Finally, by Michel et al.'s own lights, aphantasics *do* form imagistic representations in imagery tasks. Yet, if aphantasics produce imagery in imagery tasks, why not in these tasks? Michel et al. suggest that

imagery contents. Specifically, Arcangeli suggests that mental rotation in aphantasia involves mental imagery accessed without sensory imagination. She offers two ways to understand this. The first involves access to mental imagery contents via a distinct attitude, a "sort of sensory analogue of entertaining" (31). But we are not told what distinguishes this attitude from sensory imagination itself. The second involves mental imagery being "sub-personally accessed by cognitive mechanisms without … a corresponding personal-level attitude" (ibid.). This seems very close to unconscious imagery.

[19] Other potential 'objective' indicators include an increased susceptibility to 'pseudo-hallucinations' following prolonged exposure to rhythmic flicker (Königsmark et al., 2021; Reeder, 2022) and reduced visual discomfort and distortions in a pattern glare task (Dance et al., 2021).

[20] Blomkvist presses Nanay on this point, but appears to misconstrue his proposal, claiming that his view is that "aphantasics lack voluntary unconscious visual imagery" (2023: 875). Nanay's proposal is rather that aphantasics' unconscious "voluntary mental imagery does not prime their binocular rivalry performance" (2021: 7).

imagery was not incentivized. But lack of incentives does not prevent aphantasics imagining in other tasks such as Chang et al. (2025), discussed above.[21]

To summarize: Patterns of performance together with neurophysiological data provide strong evidence that aphantasics use imagery in at least some imagery and visual working memory tasks. On the other hand, VVIQ responses and objective measures suggest that imagery is missing. None of the four accounts hitherto canvassed explain this perplexing body of data.

I now defend an account that does. This account attributes preserved performance (not ascribable to alternative strategies) to spared imagery—agreeing with imagery accounts. But it denies that imagery in general is preserved, freeing it to explain failures to report imagery and objective markers of aphantasia as reflecting genuine imagery loss—agreeing with no imagery accounts. This middle-ground approach has been obscured by over-reliance on the VVIQ to diagnose aphantasia.

4 | BEYOND VIVIDNESS

Aphantasia is standardly diagnosed via VVIQ score. Many concerns have been raised about this questionnaire (e.g., Kaufmann, 1981) and its use as a diagnostic tool (e.g., Blomkvist & Marks, 2023). Three are worth registering here.

First, the VVIQ exclusively focuses on visual imagery. Thus, a subject may have rich, non-visual imagery despite the lowest VVIQ score. Dawes et al. (2024) report a large-scale analysis of multi-sensory imagery deficits using Sheehan's shortened QMI and the VVIQ. Their results suggest an extremely heterogeneous population, with ∼30% of aphantasics reporting only absent visual imagery, ∼24% reporting a complete absence of sensory imagery, and the remainder other profiles, e.g., selectively spared somatic (∼5%) or auditory imagery (∼4%). Almost no studies distinguish purely visual and total aphantasics; many talk of subjects with low VVIQ scores as "not having any conscious mental imagery whatsoever" (Nanay, 2021: 5).

Second, many analyses lump together subjects reporting absolutely no visual imagery (VVIQ = 16) and subjects who do report imagery (e.g., VVIQ = 17–32).[22] These analyses may miss performance impairments in the no imagery group (Krempel & Monzel, 2024). For instance: Pounder et al. (2022) find slower mental rotation times specifically in VVIQ = 16 subjects; Zeman et al. (2020, Supp. Materials) find that VVIQ = 16 subjects report significantly fewer visual dreams and greater use of a non-visualization strategy in their 'windows task' in which subjects had to mentally count the windows in their home; and Reeder (2022) finds a dramatic jump in susceptibility to flicker-induced pseudo-hallucinations between those reporting no imagery (0/10) and those who report some imagery (1–10/10) on her simplified vividness questionnaire.

Finally, the VVIQ—like all questionnaires and self-report measures—is a subjective measure, requiring subjects themselves to decide how to score their imagery. As is familiar from studies of alleged unconscious perception, subjects may fail to report degraded percepts because of conservative response biases (e.g., Eriksen, 1960; Holender, 1986; Irvine, 2012; Phillips, 2016, 2018, 2021a).

[21] Appealing to incentives also generates the clear—and, I suggest, implausible—prediction that aphantasics will exhibit imagery-based pupillary light responses when incentivized.

[22] Siena and Simons suggest that their "cutoff score of 32 nonetheless corresponds to very weak visual mental imagery across all questionnaire items" (2024: 1580). But a score of 32 could be achieved by reporting moderately clear and vivid imagery on some items and none on others.

We should expect the same with imagery. Given this, a total lack of reported imagery cannot be assumed to be a total lack of imagery. Zeman et al. (2020) asked aphantasic subjects if they experienced occasional, "brief flashes" of imagery. Considering just VVIQ = 16 subjects, 30% reported such flashes and nearly 10% were unsure; in the VVIQ = 17–23 group, a clear majority reported such flashes (Supp. Materials, Figure S1).

These points raise the possibility that the puzzle of aphantasia may reflect degraded or partially spared conscious imagery which is unreported but nonetheless functionally adequate in relevant tasks. As mentioned, Michel et al. (2025) compare aphantasia to blindsight. For them, this means that aphantasia involves unconscious imagery to which subjects have "'blank'" cognitive access, just as blindsight is commonly held to involve exploitable, unconscious vision. However, Michel et al. do not consider an alternative interpretation of blindsight on which it reflects (severely and qualitatively) degraded conscious vision, unreported due to conservative response biases (Campion et al., 1983; Overgaard, 2012; Phillips, 2021a, 2021b). Aphantasia admits an analogous interpretation on which it involves selectively impaired imagery unreported on standard measures.

To pursue this idea, let us begin by focusing on a further and surprisingly neglected problem with the VVIQ, the fact that it selects 'vividness' as the single, fundamental dimension along which to assess imagery.[23] Prima facie, it is puzzling why anyone would think that vividness constituted the fundamental property of imagery (cf. Morris & Hampson, 1983). No-one would claim that perceptual variation was exclusively a matter of vividness. What would this even mean? Furthermore, to do well on imagery tasks, vivid imagery is neither necessary nor sufficient (Dean & Morris, 2003: 247). Take mental rotation. Imagining a shape in a vivid and realistic way is insufficient for good performance, since it does not guarantee imagining the shape and rotation accurately. It is also unnecessary, and arguably detrimental. As Farah et al. (1988; citing Hinton, 1979) point out, the fact that rotation in depth is as easy as rotation in the picture plane suggests that schematic as opposed to visually detailed representations are being utilized. Moreover, Khooshabeh and Hegarty (2008) find that inconsistently coloured shapes impair performance in low spatial ability subjects, suggesting that they are hindered by imagining in colour.

Along what dimensions should we assess imagery? In classic work from the eighties, Farah and colleagues provide compelling neuropsychological evidence that mental imagery has doubly dissociable "visual and spatial components" (Farah et al., 1988: 439). Specifically, Farah et al. distinguish between visual imagery, viz: "modality-specific representations that encode the literal appearance of objects, including perspective properties, color information, and aspects of form not available through touch or other modalities," and spatial imagery, viz: "relatively abstract, amodal, or multimodal representations of the layout of objects in space with respect to the viewer and each other" (1988: 442–3; cf. Neisser & Kerr, 1973; Kerr & Neisser, 1983).

In support of a double dissociation, Levine et al. (1985) report two patients with brain damage: the first with "excellent" (1012) spatial imagery but impaired visual imagery (e.g., for colours, faces and animals); the second with "good" visual imagery but "severely impaired" (1014) spatial imagery. Farah et al. (1988) further describe a patient showing normal performance on a battery of spatial imagery tasks (e.g., mental rotation, map scanning, matrix memory) but profoundly impaired performance on visual imagery tasks (e.g., colour memory, size comparison,

[23] As Dean and Morris (2003) discuss, the VVIQ also specifically focuses on images of 'real life' scenes and objects drawn from long-term memory. This contrasts the imagery used in many imagery tasks which is schematic and constructed in the moment.

animal tails); and Morton and Morris (1995) report a patient with impaired spatial but not visual imagery.[24]

Further reason for distinguishing visual and spatial imagery comes from selective interference experiments in which imagery tasks are conducted alongside secondary tasks. Here, nonvisual spatial secondary tasks (e.g., tracking the location of a sound while blindfolded) interfere with spatial imagery tasks (e.g., Baddeley & Lieberman, 1980), but nonspatial visual secondary tasks interfere with visual imagery tasks (e.g., Atwood, 1971).

Over the last two decades, Kozhevnikov, Blazhenkova and colleagues have championed the need to assess individual variation along much the same dimensions. Thus, Kozhevnikov et al. (2002) provide interview and observational data to distinguish between what they call "spatial" and "iconic" visualizers; and Kozhevnikov et al. (2005) argue on the basis of questionnaire and behavioural data for a fundamental distinction between "object visualizers" who are "especially good in constructing vivid, pictorial, and detailed images of individual objects" and "spatial visualizers" who "excel in creating images that represent spatial relations among objects and in imagining spatial transformations" (712; Blazhenkova & Kozhevnikov, 2009).

It is a delicate question how precisely to understand the visual/spatial distinction for different explanatory purposes. But for the present purpose of addressing the puzzle of aphantasia, I distinguish between *visual-object imagery* and *spatial imagery* as follows. *Visual-object imagery* refers to characteristically rich and detailed imagery of objects and their features as distinctively presented in visual experience. Most obviously, visual-object imagery includes colour, contrast and brightness imagery, for such features can only be presented visually. It also includes imagery of features presented in a distinctively visual manner, for instance, glossiness as perceived through highlights and reflections, or shape as perceived from a distinctively visual perspective. Paradigmatic cases of visual-object imagery include imagining a bright golden sun surrounded by a clear blue sky; flashes of lightning against dark storm clouds; a beautiful rainbow; dark green, pine trees reflected in a mountain lake; or the colours, shapes and visual details of candies in a sweet shop window. (All examples inspired by scene prompts from the VVIQ.)

Spatial imagery, in contrast, refers to characteristically abstracted or schematic imagery of spatial features available through more than one sense modality. Such imagery may be strictly amodal in the sense of representing a perceived spatial feature without commitment to a specific modality in which the feature is perceived. We might, for example, imagine a location, spatial relation, intrinsic shape or spatial structure in a manner which is neutral as to whether the location, relation, shape or structure is imagined as seen or touched.[25] However, in this context, imagery which does specify a modality, including vision, can also be considered as spatial, so long as it is sufficiently abstract and schematic that it is liable to be unreported in relation to VVIQ prompts. Indeed, since the VVIQ only enquires about visual imagery, even rich and detailed non-visual spatial imagery (e.g., haptic, proprioceptive, and motor imagery) can be counted as spatial for present purposes.

The proposal to be developed is that spatial imagery in this broad and heterogenous sense (i.e., of some or all these kinds) can account for task performance in standard imagery tasks despite

[24] For a review of this and other neuropsychological evidence, see Bartolomeo, 2002.

[25] For an extremely helpful framework for thinking about different layers of shape representation, and a defense of the proposal that abstract, object-centred medial-axis shape-skeleton representations (Kimia, 2003; Feldman & Singh, 2006) are constitutively multimodal in two precise senses, see Green, 2022.

commonly not being reported in response to VVIQ-type prompts. Much further work is needed to establish precisely what kinds of imagery are present in different forms of aphantasia.[26]

Behavioural and neuropsychological evidence indicates that capacities for spatial and visual-object imagery fractionate further. For instance, Goldenberg (1993) reports case studies evidencing the dissociability of imagery of "shapes of objects, colours of objects, faces, letters and spatial relationships." And Thompson et al. (2009) appeal to neuroimaging data to argue that visualizing spatial location and mental transforming location are distinct capacities. Such finer distinctions will be essential for any complete understanding of individual differences in imagery. But, as I now argue, the fundamental distinction between spatial and visual-object imagery provides the key for unlocking the puzzle of aphantasia.

5 | SOLVING THE PUZZLE OF APHANTASIA

Why do self-reports and objective indicators in aphantasics suggest that imagery is missing when their performance suggests otherwise? The answer is that some imagery is missing whilst other imagery is spared. Specifically, following Blazhenkova and Pechenkova (2019), I propose that the most commonly diagnosed form of aphantasia involves loss or severe degradation of visual-object imagery but sparing of spatial imagery. This profile elegantly explains the perplexing data encountered above.

Performance in imagery tasks. Aphantasics perform comparably to controls in tasks traditionally thought to require imagery, specifically, as we saw: Spatial Span, Mental Rotation and One Touch Stockings tasks (Pounder et al., 2022; Fig. 1). In the Spatial Span task, subjects must reproduce a sequence of colour changes in a display of white boxes—the standard strategy here being to link targets with imaginary lines. This strategy plainly requires only spatial imagery. This could be amodal or simply abstract and schematic imagery—imagining the abstracted spatial relation between boxes, in the absence of any visually specific details. It could also be haptic or motor imagery; subjects could imagine 'connecting the dots with their mind's hand' or simply executing the required motor response for the task.

In the Mental Rotation task, subjects determine whether two shapes are rotations of one another. Again, spatial imagery suffices. This could be amodal, or schematic structural spatial imagery of the shape (recall: Farah et al., 1988; Hinton, 1979; Khooshabeh & Hegarty, 2008). Or it could be motor or haptic imagery—subjects might imagine grasping the shape and rotating it. This would equally produce a characteristic linear relation between response time and rotation angle.[27] Evidence of this comes from neuroimaging studies in neurotypical subjects showing involvement of motor areas in rotation tasks[28] and from studies of mental rotation in congenitally blind individuals who presumably exploit haptic imagery.[29]

[26] For a somewhat different but nonetheless highly congenial approach which I learned of only after writing this paper, see Teng (2025), where a distinction between 'painterly' and 'schematic' imagery is invoked to address the puzzle of aphantasia.

[27] Cf. Lorenzatti, 2023: 17.

[28] Richter et al., 2000; also, Parsons et al., 1995; Cohen et al., 1996; Kosslyn et al., 2001.

[29] Marmor & Zaback, 1976; Carpenter & Eisenberg, 1978; Prather & Sathian, 2002. As Thomas (2021) notes: "all the major experimental effects that supposedly reveal the spatial and non-verbal properties of visual imagery (such as mental rotation, scanning, size/inspection time effects, and selective interference), have now been demonstrated in totally congenitally blind subjects." See references in original.

Finally, in the One Touch Stockings task, subjects must calculate the minimum number of moves needed to rearrange three coloured balls. Here too spatial imagery suffices. This could be haptic or motor; one might imagine moving each ball around with a different finger (cf. Pylyshyn, 1989). Or it could be amodal or abstract spatial imagery, exploiting an index to track each ball's imagined movement without attributing any visually specific features. The task does require that a specific colour arrangement is achieved. However, this does not demand visual colour imagery. Either the colour linked to each index could be encoded in a non-visual format (highlighting the possibility of hybrid formats and strategies) or each index could be linked to the position of the corresponding target location without colour information being encoded in the image at all ('*This* ball needs to get *here*; *that* ball to *there*, etc.').

Performance in visual working memory tasks. In Knight et al. (2022) and Weber et al. (2024), subjects held the orientation of a briefly presented Gabor patch in working memory through a delay. Must this involve the subject maintaining a visual image of the oriented Gabor? No. Orientation can be represented as an abstracted spatial feature without representing any of the Gabor's specifically visual details (e.g., contrast and spatial frequency). A subject might also imagine orienting or moving their hand, or their planned motor response. Reeder et al. (2024) find that aphantasics predominantly report using precisely such spatial and sensorimotor strategies in a similar task involving the comparison of two oriented gratings across a 4 second delay (respectively: "I remembered a place or position on the screen in which e.g. a bar ended," and "I imagined tracing e.g. with my finger or eyes, back and forth along the orientation").

Objective measures. Three 'objective' measures of aphantasia confounded traditional (e.g., unconscious) imagery accounts of aphantasia. They are easily explained by the present view. Absence of an imagery-based pupillary light response can be explained by a lack of brightness imagery. Flat-line galvanic skin responses to frightening stories (but not pictures) can be explained by a lack of vivid, visual-object imagery. Very plausibly, merely imagining denuded or abstracted spatial structure does not cause us to break a sweat. Finally, absence of priming in binocular rivalry can be explained by a lack of colour imagery, since the rivalrous stimuli to be imagined were red and green. Similarly, the absence of object-imagery based priming in visual tasks is predictable if subjects do not enjoy such imagery.[30]

VVIQ scores. On our account many diagnosed aphantasics do have spatial imagery. Why do they not report it on the VVIQ? The answer is that the VVIQ is too narrow. On the one hand, it is too narrow in focusing exclusively on visual imagery, crucially neglecting haptic, proprioceptive, kinaesthetic and motor imagery. On the other (and less obviously), it is too narrow in focusing exclusively on visual-object imagery as judged by a comparison with ordinary perception. An aphantasic who enjoys only amodal or abstract spatial imagery will naturally deny having visual imagery on the VVIQ, since their conscious imagery lacks distinctively visual features (e.g., brightness, colour, visual texture, contrast), and so is radically unlike ordinary seeing. Certainly, they will not count their imagery as "5: Perfectly clear and as vivid as normal vision," but they may understandably not even count their experience as "2: Vague and dim," since their denuded imagery lacks brightness, colour, contrast, etc. Indeed, if their spatial imagery is truly amodal (as opposed to merely abstract and schematic), their imagery will be no more visual than haptic.

[30] The present account may also explain Keogh and Pearson's (2014) finding, discussed by Lorenzatti (2023: 20), that background luminance interferes with performance in a visual working memory task in 'high' but not 'low' imagers without postulating a completely non-imagistic strategy in the 'low' imagers.

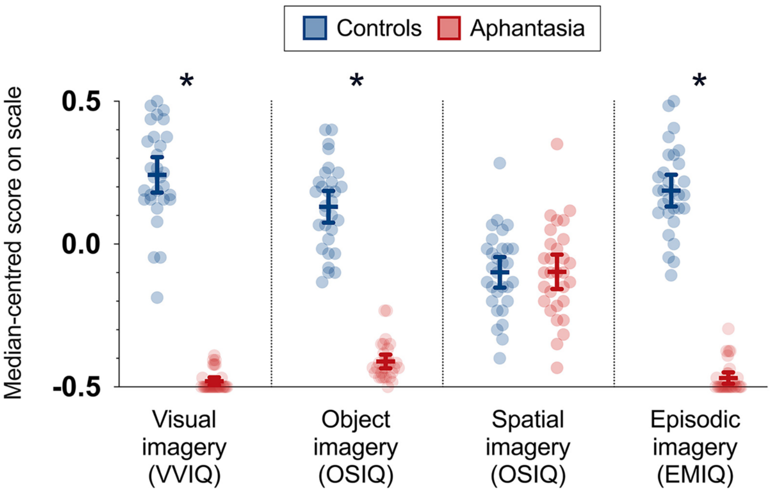

FIGURE 2 Scores from 30 aphantasic and 30 control subjects on four imagery questionnaires. Note the large differences in VVIQ, OSIQ: Object Imagery and EMIQ, but lack of difference in OSIQ: Spatial Imagery. Scores are median centred in relation to each scale. Reprinted from Dawes et al., 2022: 6, Fig. 1, © 2022, with permission from Elsevier. [Color figure can be viewed at wileyonlinelibrary.com]

Our account thus elegantly explains the data so far surveyed.[31] However, a strong positive case can also be provided based on evidence that aphantasics *do* report spatial imagery when probed appropriately and that such reports correlate with performance on corresponding tasks.

Blajenkova et al. (2006) present a novel Object-Spatial Imagery Questionnaire (OSIQ) designed using principal component analysis to independently assess spatial and visual-object components of imagery. Heavily object-imagery loaded questions include: "I can close my eyes and easily picture a scene that I have experienced." "My images are very colourful and bright." Heavily spatial-imagery loaded questions include: "I can easily imagine and mentally rotate 3-dimensional geometric figures." "My images are more like schematic representations of things and events rather than detailed pictures." (2006: 245) Aphantasics score at least as well as controls on the spatial component of the OSIQ (Keogh & Pearson, 2018; Dawes et al., 2020; Bainbridge et al., 2021; Dawes et al., 2022; see Fig. 2 below). These reports support the claim that spatial imagery is

[31] Ned Block pressed me to explain how my account could explain data reported by Liu and Bartolomeo (2023) from an online study using the French-language Battérie Imagination-Perception. Liu and Bartolomeo's subjects first heard a domain (e.g., 'shape'), then two items which they were to imagine (e.g., 'beaver' and 'fox') and finally an attribute with which to compare the items (e.g., 'long'). Aphantasics performed with similar accuracy to controls across all domains, although they were consistently slower except in the 'spatial relations' domain. Liu and Bartolomeo see their findings as motivating an unconscious imagery account of aphantasia. However, performance across all but one of their tested domains is easily accounted for in terms of spatial imagery—the relevant attribute words being (the French words for) 'long,' 'round,' 'high,' 'low,' 'right,' and 'left'. The only exception is the colour domain, where the attribute words were 'foncé' (dark/deep) and 'claire' (light/pale). However, *pace* Liu and Bartolomeo, it seems perfectly reasonable to think that aphantasics (and, indeed controls) might have exploited non-visual semantic strategies in this domain (and perhaps others). These would very plausibly have been available for the food items in question, such as banana, orange, cauliflower, and courgette. Moreover, this hypothesis is quite consistent with subsequent data showing activation of high-level colour-perception regions in the task (Liu et al., 2025). For there is independent evidence that such regions are activated by colour knowledge retrieval (Simmons et al., 2007). See Teng (2025) for a different response to (and much more extensive discussion of) Liu and Bartolomeo's work.

spared in aphantasia and undermine the suggestion (e.g., in Nanay, 2021) that it is unconscious.

Studies also show that performance on spatial imagery tasks correlates with reported spatial imagery. Dean and Morris (2003) asked subjects to take 2D and 3D mental rotation tasks, and complete the VVIQ and a specially designed questionnaire. Predictably, VVIQ scores utterly failed to correlate with performance in either task. However, several items in the novel questionnaire which specifically asked subjects to imagine the displayed shape showed significant correlations, for instance: "How easily can you evoke an image of this shape?" "How much of the shape can you form an image of at any one time?" "How easily can you imagine the rotation?" And: "How vivid is your image of the shape rotating?" Dean and Morris conclude: "the major reason a relationship was not previously found between imagery questionnaires and spatial tests was because of the item type" (2003: 267)

Similarly, Blajenkova et al. (2006) correlated OSIQ scores with performance on various tests. They found significant positive correlations between spatial imagery scores and three spatial imagery measures (mental rotation, paper folding, and a spatial imagery battery). In contrast, object-imagery scores only significantly correlated positively with an object-imagery measure (a degraded picture recognition task) and negatively with the spatial paper folding task.[32]

These correlations between performance and self-report complete our case that the puzzle of aphantasia arises because subjects standardly identified as aphantasic lack visual-object imagery but have preserved spatial imagery. This explains their intact performance (and corresponding neural evidence) in imagery tasks since these largely draw on spatial imagery. It also explains subjective reports (both positive and negative) and 'objective' measures of aphantasia since these specifically reflect loss of visual-object imagery.

Although it has been my focus here, aphantasia should not simply be identified with loss of visual-object imagery. The neuropsychology literature highlights individuals with impaired *spatial* imagery but spared visual-object imagery. And although reliance on the VVIQ means that congenital spatial aphantasia is far less recognized than visual-object aphantasia, such a condition is to be predicted (Blazhenkova & Pechenkova, 2019). Indeed, based on OSIQ responses in a 434-large sample, Palermo et al. (2022) found 3.1% of respondents were visual-object aphantasic, 3.5% spatially aphantasic, and one both.

Subtler distinctions will doubtless be needed too, corresponding to the many dissociable subcomponents of visual-object and spatial imagery (cf. Blomkvist, 2023: 884f.); for instance, specific deficits in imagining spatial transformations (cf. Poltrock & Brown, 1984) or in imagining faces or letters (cf. Goldenberg, 1993). We should think of 'aphantasia' on analogy with 'agnosia' as a generic label for a range of imagery deficits, anticipating a complex landscape of loss and sparing which echoes the manifold ways perception can be selectively impaired.

6 | CONCLUSION

How can individuals professing to lack imagery nonetheless perform normally on tasks which seem to require it? This puzzle of aphantasia has baffled scientists and philosophers since the late

[32] Blazhenkova (2016) further presents a Vividness of Object and Spatial Imagery (VOSI) questionnaire, probing vividness of imagery in VVIQ-style but including specific spatial items (e.g., schematic plans, mechanisms, maps, and model movements) as well as specific object items (e.g., colour pattern on a butterfly wing, the shape of a grasshopper). She finds that object (spatial) vividness ratings correlate with object (spatial) task performance. This questionnaire is currently being tested in larger populations (see, Blazhenkova et al., 2024).

nineteenth century, leading theorists to postulate idiosyncrasies in self-understanding, impairments in introspection, dissociations of performance and awareness, and unspecified alternative strategies. There is a certain irony here. The earnest desire to respect subjective reports has motivated accounts which variously diminish the first-person perspective. Here, I have argued that we can give subjective reports their full due. But only if we reject the overly simplified conception of imagery which lures theorists into treating denials of vivid, visually realistic imagery as grounds for thinking that all forms of conscious imagery are absent. Our streams of consciousness, no less than our minds more generally, are rich and complex. Only by acknowledging that complexity can we properly understand our individual differences.[33]

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[33] I was very pleased to discuss this paper at an NYU Mind and Language seminar hosted by Ned Block and Eric Mandelbaum. I'm grateful to them both as well as to the other attendees for a wonderfully stimulating session. For comments on an early version of this material, I'm grateful to Chaz Firestone. Finally, thanks as always to Hanna Pickard for her unstinting advice and support.

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How to cite this article: Phillips, I. (2026). Aphantasia reimagined. *Noûs*, *60*, 65–86. https://doi.org/10.1111/nous.12551