

# Aphantasia: A Comprehensive Scientific Report

## Introduction

Aphantasia is a neuropsychological condition characterized by the inability to voluntarily generate mental imagery – in other words, a “blind mind’s eye.” Individuals with aphantasia cannot visualize people, objects, or scenes in their imagination, despite having normal vision and cognition [psyche.coparisbraininstitute.org](https://psyche.coparisbraininstitute.org). The term *aphantasia* (from Greek *a-* meaning “without” and *phantasia* meaning “imagination”) was coined in 2015 by neurologist Adam Zeman and colleagues, following their description of individuals with lifelong absence of visual imagery [psyche.co](https://psyche.co). Historically, the phenomenon was hinted at over a century ago: Sir Francis Galton’s 1880 survey on mental imagery noted that a few people reported “no visualisation” at all [pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov). However, this intriguing observation remained largely neglected until modern times. Recent years have seen a surge of scientific interest in aphantasia, alongside its opposite extreme, *hyperphantasia*, where mental images are extraordinarily vivid [pmc.ncbi.nlm.nih.gov/psyche.co](https://pmc.ncbi.nlm.nih.gov/psyche.co). Researchers estimate that aphantasia may affect roughly 2–5% of the population [frontiersin.org/psyche.co](https://frontiersin.org/psyche.co), although exact prevalence depends on definitions. Both congenital (lifelong) and acquired cases have been documented – some people are born without imagery, while others lose the “mind’s eye” after brain injury or psychological events [link.springer.com](https://link.springer.com). Importantly, aphantasia is not considered a disorder; rather, it is a variant of human experience [parisbraininstitute.org](https://parisbraininstitute.org). Many discover their aphantasia only when realizing that others can visualize. This report provides a comprehensive overview of the current scientific understanding of aphantasia. We examine its neurological basis, cognitive effects, psychological impacts, methods of diagnosis, comparison with hyperphantasia, and implications for education and society, highlighting key research findings throughout.

## Neurological Basis and Brain Imaging Findings

**Brain Networks Involved:** Modern neuroimaging has begun to reveal how the brains of aphantasic individuals differ in function and connectivity. Aphantasia does *not* appear to stem from gross anatomical damage – structural MRI studies find no significant differences in brain region volumes between aphantasic and typical individuals [pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov) [pmc.ncbi.nlm.nih.gov](https://pmc.ncbi.nlm.nih.gov). Instead, evidence points to differences in how brain areas communicate during imagination. Visual imagery normally engages a widespread network: higher-order frontal and parietal “control” regions activate and coordinate with visual sensory regions (occipital and temporal cortices) to generate and maintain mental pictures [parisbraininstitute.org](https://parisbraininstitute.org) [parisbraininstitute.org](https://parisbraininstitute.org). In people with aphantasia, these same core regions can activate when prompted to visualize, but they appear to operate less efficiently *together*. Recent high-resolution fMRI experiments indicate that aphantasic individuals show reduced functional connectivity between fronto-parietal networks and the visual occipital regions during mental imagery tasks [parisbraininstitute.org](https://parisbraininstitute.org) [parisbraininstitute.org](https://parisbraininstitute.org). In other words, the

“command” regions for imagination are intact and attempt to activate the visual cortex, but the signals may be too weak or disjointed for a vivid image to emerge in consciousness. This aligns with the theory that vivid imagery requires robust integration between the brain’s visualization command centers and sensory visual areas [parisbraininstitute.org](http://parisbraininstitute.org). Indeed, one study using ultra-high-field 7T fMRI found that when asked to visualize familiar objects and scenes, aphantasic individuals activated similar brain areas as typical imagers (including frontal attentional regions, the fusiform gyrus for object/face imagery, and ventral temporal areas for scenes and letters), yet these regions communicated less effectively with each other in the aphantasia group [parisbraininstitute.org](http://parisbraininstitute.org). Aphantasia thus might reflect a network connectivity deficit: the “nodes” of the imagery network are present and responsive, but the connecting pathways function suboptimally.

*Figure: Brain activation differences in imagery. Brain scans comparing individuals with hyperphantasia (extremely vivid imagery) and aphantasia show that during attempted visualization, people with aphantasia have reduced activation in key areas. In this fMRI study, visualizing familiar faces/places elicited strong parietal lobe activity (red clusters) in hyperphantasics and typical imagers, whereas aphantasic participants showed significantly less activation in these regions [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). This suggests aphantasia involves diminished engagement of fronto-parietal areas that normally drive vivid mental images. [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov)*

**Functional MRI Findings:** The first systematic brain imaging study of aphantasia (by Zeman et al., 2021) compared individuals across the imagery spectrum – 24 with aphantasia, 25 with hyperphantasia, and 20 with mid-range imagery [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). In a resting-state fMRI analysis (measuring inherent connectivity with no specific task), striking differences emerged. People with hyperphantasia had significantly *stronger* intrinsic connectivity between the visual occipital network and frontal brain regions (in prefrontal cortex, Brodmann areas 9/10/11) compared to aphantasic individuals [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). This suggests that vivid visualizers’ brains maintain a richer default communication between vision-processing areas and high-level cognitive regions. By contrast, the aphantasic group showed some *stronger* connections in other circuits – for example, stronger coupling between the hippocampus and an anterior cingulate region, and between certain attention control networks and frontal areas – but notably lacked the robust fronto-visual links seen in hyperphantasia [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). Task-based fMRI (during active visualization of images versus simple perception) reinforced these findings. When participants attempted to visualize famous faces and places, those with aphantasia showed markedly less activation in the frontal and parietal regions associated with imagery generation [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). In particular, a region in the anterior parietal lobe (near the intraparietal sulcus and somatosensory cortex) that lit up strongly in hyperphantasic and control subjects during imagination was much less active in aphantasics [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). The same was true for a smaller area in the right parietal lobe and parts of the cerebellum and thalamus – all showing greater recruitment in those with vivid or normal imagery compared to those without [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). These patterns suggest that aphantasia involves a blunting of the usual top-down activation of visual areas by frontal/parietal “imagery control” regions. As a result, the primary visual cortex may receive insufficient or uncoordinated

input to produce conscious visual sensations. Consistent with this, new research using *decoding* methods found that early visual cortex in aphantasic people contains less decodable image-specific information when they attempt to imagine something, compared to non-aphantasics [frontiersin.org](https://www.frontiersin.org). Intriguingly, aphantasic brains still *try* to generate images: a 2025 study reported that when aphantasic individuals were cued to visualize, their primary visual cortex did become active – indicating a “blueprint” or weak image is formed – but the image remains unconscious or inaccessible [unsw.edu.au](https://www.unsw.edu.au). This challenges the simple assumption that V1 activation always yields a visible mental picture, pointing instead to connectivity and neural amplification as critical factors [unsw.edu.au/parisbraininstitute.org](https://www.unsw.edu.au/parisbraininstitute.org).

**Hippocampus and Memory Circuits:** Brain imaging also hints at the role of memory structures in aphantasia. The hippocampus – essential for vivid episodic memory re-living and scene construction – may behave differently in those without imagery. One neuroimaging study noted that aphantasia was associated with *decreased* hippocampal activation (and conversely increased visual cortex activation) during autobiographical memory tasks, relative to controls [frontiersin.org](https://www.frontiersin.org). This could reflect aphantasic individuals relying more on factual or verbal recall (engaging visual cortex less) and retrieving fewer rich sensory details (hence lower hippocampal engagement). Additionally, resting-state analyses have found that aphantasic participants had stronger coupling between the hippocampus and some frontal regions *not* typically linked to visual imagery [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). Researchers speculate that lacking a “mind’s eye” might prompt the brain to compensate by using alternate networks or strategies (for instance, relying on conceptual associations via frontal cortex rather than visual re-living via hippocampal–occipital loops) [parisbraininstitute.org](https://www.parisbraininstitute.org). Notably, no evidence of major hippocampal damage or malformation is seen in aphantasia [frontiersin.org](https://www.frontiersin.org), underscoring that this condition is a subtle functional variation rather than any gross neurological lesion [frontiersin.org](https://www.frontiersin.org).

**“Wiring” Differences:** In summary, current imaging points to aphantasia as a problem of network dynamics: the brain’s visual system is intact and can process actual sights normally, but the usual top-down pathways that summon imagery are underpowered or disconnected. People with aphantasia may have a *different wiring of the visual brain*, wherein signals from frontal/parietal regions do not sufficiently ignite the visual cortex [unsw.edu.au](https://www.unsw.edu.au). This idea is supported by multiple converging findings: diminished fronto-visual connectivity at rest [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov), lack of typical parietal lobe activation during mental visualization [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov), and weak or absent physiological indices of imagery (like pupillary changes and visual cortex decodability, discussed later). Importantly, aphantasia is *not* due to lack of knowledge – aphantasic individuals still know what things look like. For example, they can tell you that grass is green or describe the layout of their house; they simply cannot **see** those images in their mind. One study noted that aphantasic people retain accurate visual semantic knowledge (color, shape, spatial details) even if they report no inner pictures, suggesting the visual information is stored normally but accessed in a more abstract or verbal form [parisbraininstitute.org](https://www.parisbraininstitute.org). The neurological picture of aphantasia is still emerging, but it highlights the brain’s complexity in producing conscious imagery. As neuroscientist Joel Pearson put it, “people with aphantasia actually do seem to have images of a sort – but the images remain too weak or distorted to reach conscious awareness,” likely because the visual cortex is activated in an atypical, fragmentary way [unsw.edu.au](https://www.unsw.edu.au). Ongoing studies

(including diffusion tensor imaging of white matter tracts and magnetoencephalography) are probing whether subtle structural or timing differences in neural signaling underlie this “mind’s eye blind spot.” But so far, the evidence consistently indicates that aphantasia’s root lies in functional connectivity and neural dynamics rather than any obvious anatomical abnormality [frontiersin.org](https://www.frontiersin.org) [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/).

## Cognitive Effects of Aphantasia

Aphantasia offers a unique window into how mental imagery contributes to various cognitive processes. By examining individuals with no visual imagery, researchers can infer which abilities normally benefit from picturing information in the mind. Key domains of cognition affected by aphantasia include memory (especially autobiographical memory), imagination and future thinking, spatial reasoning, and dreaming. Below we explore findings in each area.

**Memory and Imagination:** Visual imagery has long been thought to support *episodic memory* – the vivid recollection of life events – and to aid imagination of hypothetical or future scenarios [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/) [frontiersin.org](https://www.frontiersin.org). Consistent with this, people with aphantasia show notable differences in certain memory tasks. Perhaps surprisingly, on standard laboratory memory tests (e.g. word lists or factual recall), aphantasic individuals perform normally [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/). In one study, their scores on visual and spatial working memory tasks were equivalent to those of people with imagery [nature.com](https://www.nature.com). However, when it comes to **autobiographical memory** – recalling one’s personal past experiences in rich detail – aphantasia has a clear impact. Multiple studies have found that aphantasic people remember past events with significantly fewer sensory details and less vividness than those with typical imagery [frontiersin.org](https://www.frontiersin.org) [frontiersin.org](https://www.frontiersin.org). For example, they might recall the factual outline of a vacation (who went, what happened) but report that the memory feels “dim” or mostly verbal, lacking the mental snapshots or “replaying” that others experience. In a 2020 survey study, aphantasic participants rated their autobiographical memories and imagined future events as much less vivid and richly detailed compared to controls [nature.com](https://www.nature.com) [nature.com](https://www.nature.com). This suggests visual imagery normally serves a *constructive role* in binding together the elements of an episodic memory – the sights, people, and setting – and in envisioning future scenes [nature.com](https://www.nature.com) [nature.com](https://www.nature.com). Without imagery, aphantasic individuals rely more on semantic memory (knowledge about facts and concepts) to remember events. As a result, their recollections tend to contain more general information and fewer specific episodic details [frontiersin.org](https://www.frontiersin.org) [frontiersin.org](https://www.frontiersin.org). Notably, the difference extends beyond just visual details: aphantasics often report a global reduction in the *overall* richness of memory, including fewer sounds, smells, and emotions recalled [frontiersin.org](https://www.frontiersin.org) [frontiersin.org](https://www.frontiersin.org). One group of researchers summarized this as aphantasia causing “impaired scene construction and reduced autobiographical reliving,” akin to remembering in a more abstract, story-like form rather than re-living a vivid scene [frontiersin.org](https://www.frontiersin.org) [frontiersin.org](https://www.frontiersin.org). These findings mirror the pattern seen in patients with certain brain injuries (like hippocampal damage) who also recall past events with sparse detail [frontiersin.org](https://www.frontiersin.org) [frontiersin.org](https://www.frontiersin.org), though healthy aphantasic individuals are not amnesic – they remember the occurrence of events, just with a different phenomenology.

Importantly, aphantasia affects *voluntary* visualization and memory recall more than involuntary remembering. Aphantasic people rarely experience intrusive visual flashbacks or involuntary

imagery, which may slightly reduce the intensity of some memories (this point is discussed further under emotional impacts). When asked to *imagine* or plan future scenarios, aphantasic participants likewise produce fewer details. They can outline what might happen (“next year I plan to visit X, we will probably do Y”) but do not mentally see those future scenes[frontiersin.org](https://doi.org/10.3389/fpsyg.2019.01611). Empirical studies confirm that individuals with aphantasia generate less detailed descriptions of imagined future events compared to those with imagery[frontiersin.org](https://doi.org/10.3389/fpsyg.2019.01611). In one experiment, when asked to create novel fictional scenes or envision themselves in a hypothetical situation, aphantasic volunteers provided significantly fewer descriptive elements (visual or otherwise) than controls[frontiersin.org](https://doi.org/10.3389/fpsyg.2019.01611)[frontiersin.org](https://doi.org/10.3389/fpsyg.2019.01611). Their narratives were still coherent, but lacked the “color” and specificity that imagery can provide. This underscores how the mind’s eye contributes to the richness of creative imagination and prospective thinking – without it, people may rely on logical or semantic construction of scenarios, yielding simpler, less evocative mental simulations.

Interestingly, despite these differences in subjective experience, many objective aspects of memory function remain intact. For instance, visual working memory (short-term recall of shapes or locations) does not seem significantly impaired in aphantasia[nature.com](https://doi.org/10.3389/fpsyg.2019.01611). In one study, aphantasic individuals had normal capacity to remember a set of visual patterns briefly, although they reported that they memorized them using non-visual strategies (like verbal labels or spatial reasoning rather than picturing the pattern)[nature.com](https://doi.org/10.3389/fpsyg.2019.01611)[nature.com](https://doi.org/10.3389/fpsyg.2019.01611). This aligns with reports that aphantasic individuals develop compensatory techniques to handle tasks that others might do visually. They might memorize a picture by silently describing it to themselves or focus on logical relations instead of forming an image. Such strategy differences have been observed even in spatial memory tasks: aphantasic participants can solve complex spatial problems (like navigation or mental rotations) but tend to do so algorithmically or by inference rather than by envisioning movements or layouts[nature.com](https://doi.org/10.3389/fpsyg.2019.01611). One experimental finding is that when given memory tasks, aphantasic individuals often explicitly *externalize or verbalize* the information – for example, reciting positions or using mnemonic phrases – whereas typical imagers might just form a quick mental picture[frontiersin.org](https://doi.org/10.3389/fpsyg.2019.01611)[frontiersin.org](https://doi.org/10.3389/fpsyg.2019.01611). The end result (correct recall) can be achieved either way, but the cognitive pathway differs.

**Spatial Reasoning:** Aphantasia appears to spare many aspects of spatial cognition and reasoning, though research is ongoing. Anecdotally, some aphantasic people are skilled at mathematics, programming, or navigation, indicating that they can manipulate abstract or spatial information without needing a visual image. Scientific studies generally support the idea that *spatial abilities are largely unaffected* by aphantasia[nature.com](https://doi.org/10.3389/fpsyg.2019.01611)[nature.com](https://doi.org/10.3389/fpsyg.2019.01611). In the comprehensive 2020 survey by Dawes et al., the aphantasic group scored similarly to controls on self-reported spatial skills and on behavioral measures of spatial memory[nature.com](https://doi.org/10.3389/fpsyg.2019.01611)[nature.com](https://doi.org/10.3389/fpsyg.2019.01611). Mental rotation tests (imagining objects rotated in space) and maze navigation tasks show no significant performance deficit for aphantasic participants, suggesting they solve them analytically or using spatial language. One innovative study objectively confirmed that aphantasic individuals could recall spatial layouts but struggled with visual details: participants were shown complex images and later asked to draw them from memory[frontiersin.org](https://doi.org/10.3389/fpsyg.2019.01611). Those with aphantasia produced drawings that captured the overall spatial arrangement of objects quite well (indicating intact spatial memory), but the drawings lacked visual richness and specific features – for example, an aphantasic person might remember that a scene had three houses in a row (correct spatially) but

omit their colors or fine details[frontiersin.org](http://frontiersin.org). This “object versus spatial” memory dissociation suggests that the mind’s eye is crucial for remembering an object’s appearance, but less so for recalling where things are or the structural gist. It aligns with cognitive theories that distinguish visual-object imagery (picturing form and color) from spatial imagery (representing locations and dimensions); aphantasia seems to predominantly impact the former. Indeed, one paper titled “*Quantifying aphantasia through drawing*” found that people without visual imagery had deficits in recalling object details, but not in remembering spatial configurations[frontiersin.org](http://frontiersin.org). Overall, while aphantasic individuals might not *picture* a map in their head, they can still navigate and understand spatial relationships by other means (logical inference, verbal directions, or kinesthetic memory). Any slight disadvantages in spatial tasks are often overcome by such compensatory strategies. For example, aphantasic architects or engineers report relying on schematic thinking and written plans in lieu of visualizing structures, yet they can achieve the same functional understanding of space.

**Dreaming:** One of the most fascinating cognitive facets of aphantasia is its impact on dreaming and spontaneous imagery. Dreaming is often described as “seeing” during sleep, so do people with aphantasia dream visually? Research indicates that many aphantasic individuals have markedly reduced imagery in dreams, though not all are completely devoid of visual dreams. In general, aphantasia is associated with *fewer* dreams and less vivid dream content[nature.com](http://nature.com)[nature.com](http://nature.com). In a large survey, aphantasic participants reported significantly lower frequency of dreaming – some even stating that they rarely recall any dreams – compared to people with normal imagery[nature.com](http://nature.com)[nature.com](http://nature.com). Furthermore, when they do remember a dream, they describe it as having *impoverished sensory content*. A detailed analysis of dream reports found that aphantasic individuals experience dramatically fewer visual sensations in dreams across the board (sights, colors, and even other senses like sound, touch, and smell are all diminished)[nature.com](http://nature.com)[nature.com](http://nature.com). On a questionnaire measuring dream qualities, the aphantasia group scored far lower on sensory vividness – effectively confirming that their dreams are often bland or abstract narratives rather than picture-rich experiences[nature.com](http://nature.com)[nature.com](http://nature.com). Interestingly, aphantasic dreamers also reported lower levels of *lucidity* (awareness and control within the dream)[nature.com](http://nature.com). Their dreams tend to be more conceptual: some individuals note that in dreams they “know what’s happening” but don’t *see* it clearly, as if the dream is comprised of thoughts or knowledge rather than actual images. Consistent with this, one of the few areas where aphantasic individuals outscored others was an odd dream question about “thinking in dreams” – they reported spending more time *thinking* or knowing facts during dreams, which aligns with having more semantic content in place of sensory visuals[nature.com](http://nature.com)[nature.com](http://nature.com). Despite lacking visual imagery when awake, a subset of aphantasic people do experience *some* visual dreaming. Case reports and Zeman’s survey have noted that while some have completely imageless dreams, others dream in pictures even though they cannot visualize when conscious[psyche.copsyche.co](http://psyche.copsyche.co). This suggests the neural mechanisms of dreaming imagery are partially distinct from waking imagery – possibly involving brainstem and sensory circuits that can operate without the usual frontal oversight. Nonetheless, on average, aphantasia leads to less frequent and less visually intense dreams[nature.com](http://nature.com)[nature.com](http://nature.com). This extends to daydreaming or mind-wandering: aphantasic participants in one study indicated they mind-wander or daydream slightly less often, and those mind-wanderings contain fewer vivid mental pictures[nature.com](http://nature.com)[nature.com](http://nature.com). Taken together, these findings reinforce that voluntary and involuntary imagery share common pathways. The mind’s eye that one uses

intentionally may also feed into the imagery that appears unbidden in dreams or reverie. When that faculty is absent, even the “cinema” of sleep goes mostly dark, often replaced by thoughts and narrative without visuals [nature.comnature.com](#). This unique alteration in dreaming is one reason aphantasia has been called “imagery insomnia” by some researchers – a chronic visual silence that pervades both waking and dreaming [nature.comnature.com](#).

In summary, aphantasia’s cognitive profile is characterized by normal logical and semantic processing alongside a notable lack of sensory-driven representations. Memory for facts, definitions, or prose is typically unaffected, and problem-solving ability remains strong. But tasks that benefit from “picturing it” – recalling past scenes, envisioning future events, recognizing faces, or interpreting descriptive language – can be challenging or rely on alternate thought processes. The cognitive fingerprint of aphantasia thus highlights how *imagination acts as a cognitive tool*: without it, the brain finds other ways to achieve similar ends, illuminating which mental processes usually lean on imagery for support [nature.comnature.com](#). Crucially, these adjustments seem to suffice in most situations – many people with aphantasia only realize their difference in adulthood, a testament to how seamlessly they can compensate and function using non-visual modes of thought.

## Psychological and Emotional Impacts

Beyond cognition, aphantasia can subtly influence emotional experiences, self-identity, and quality of life. Mental imagery is entwined with emotion – vivid images of positive events can evoke joy, and visualizing negative scenes can trigger fear or distress [pmc.ncbi.nlm.nih.gov](#). How does the absence of a mind’s eye affect one’s emotional processing and psychological well-being? Research is still nascent, but emerging evidence points to several intriguing effects: blunted emotional responses to imagined stimuli, a factual style of autobiographical memory (with reduced emotional reliving), and some distinctive personality and social traits among aphantasic individuals.

**Emotional Response and Imagery:** One striking finding is that people with aphantasia show diminished physiological emotional reactions to imaginative prompts. In a typical person, merely *imagining* something frightening or exciting can produce a physical response (racing heart, skin tingles, etc.), almost as if they are experiencing it. For example, reading a spooky story and visualizing it might make someone’s palms sweat. Aphantasic individuals, lacking the visual component, are much less “spooked” by mere imagination. A study by Wicken et al. (2021) measured *galvanic skin response* (sweat-induced skin conductance) while participants read emotive, fear-inducing scenarios and tried to imagine them [frontiersin.org](#). Those with normal imagery showed the expected increases in skin conductance (indicating emotional arousal), whereas aphantasic participants had significantly *diminished* skin conductance changes [frontiersin.org](#). In effect, without mental pictures, the emotional impact of the stories was blunted – the aphantasic group understood the content intellectually but did not feel the fear as viscerally [frontiersin.org](#). This provides physiological evidence that vivid mental imagery amplifies emotions, functioning almost like an internal emotional simulator [pmc.ncbi.nlm.nih.govpmc.ncbi.nlm.nih.gov](#). Relatedly, aphantasic individuals often report that recalling a happy or sad memory is a more cerebral exercise (remembering facts about what happened) rather than a transporting emotional experience. Their autobiographical

memories tend to lack the surge of feeling that usually comes from “seeing it again in your mind’s eye.” Consistent with this, studies have found that aphantasic people rate their remembered events as less emotionally intense and feel less *re-living* of the emotion compared to others [frontiersin.org](https://www.frontiersin.org). Memories are described as known *facts* (“I know I was happy at my graduation”) rather than re-experienced emotions. They also have lower confidence in the richness of their memories [frontiersin.org](https://www.frontiersin.org) – likely because without imagery, the memory feels abstract and uncertain, lacking the sensory detail that often provides a gut-level “sense of recollection.”

Does aphantasia protect against emotional disorders like PTSD, where intrusive imagery plays a role? It’s a logical hypothesis that without a mind’s eye, one might be immune to flashbacks or visual nightmares. Recent research has explored this, with intriguing but nuanced results. A 2020 study examined self-reported responses to traumatic life events in people with aphantasia [nature.com](https://www.nature.com). Overall, aphantasic individuals did *not* show a lower total level of post-traumatic stress symptoms – meaning they are not wholesale “immune” to trauma’s effects [nature.com](https://www.nature.com). They experienced emotional distress from trauma at similar rates to others. However, when looking at specific symptom categories, some differences emerged. Aphantasic participants reported *fewer intrusive memories* of traumatic events (fewer unwanted flashback images coming to mind) and less avoidance of triggers, compared to those with imagery [nature.com](https://www.nature.com). This makes sense: aphantasia may spare them the classic visual intrusions (like a vivid memory of an accident scene) that often haunt PTSD sufferers, so they may have less need to avoid reminders. On the other hand, the aphantasic group reported slightly more negative changes in mood and cognition after trauma (e.g. persistent negative thoughts or feelings) [nature.com](https://www.nature.com). None of these differences were large enough to be statistically definitive after corrections, but Bayesian analysis suggested genuine effects: strong evidence for fewer intrusive re-experiencing symptoms in aphantasia [nature.com](https://www.nature.com). In plainer terms, aphantasic people might not get the tormenting mental pictures of trauma, yet they can still suffer the emotional aftermath in other ways (anxiety, low mood, etc.). They remember that something bad happened and feel upset about it, even if they cannot *see* it in their mind. Thus, aphantasia might offer some partial emotional “shield” (especially against visual flashbacks), but it is not a guarantee of psychological resilience. Mental health is complex: even without imagery, trauma can imprint on one’s psyche through verbal, physical, and emotional channels.

**Autobiographical Memory and Identity:** The way aphantasic individuals form and use personal memories can influence their sense of self. Autobiographical memory – the tapestry of one’s life story – is typically rich with visual scenes and emotional nuances that help reinforce identity (“I remember my wedding vividly, the flowers, the smiles, how I felt”). Lacking this vivid imagery, many people with aphantasia describe their past in more factual or analytical terms. They might say their memories are “like a list of data” or that they know events happened but don’t “replay” them. Experimental data echo this description: when asked to recount past events, those with aphantasia include significantly fewer episodic details (sights, sounds, emotions) and more conceptual or semantic information [frontiersin.org](https://www.frontiersin.org). Despite this, they generally have *no impairment* in factual memory of their life (for instance, they know where they went to school, which year something occurred, etc.). The difference lies in the *quality* of recall, not the quantity of remembered facts [frontiersin.org](https://www.frontiersin.org). Psychologically, this could affect how nostalgia or personal significance is experienced. Aphantasic individuals may not feel

as strongly transported to the past, which could make emotional attachment to past events weaker. Supporting this, one study found aphantasic memories were not only less vivid but also *less emotionally charged* and held with less subjective confidence [frontiersin.org](https://www.frontiersin.org). Some aphantasic people report a sense of loss or wistfulness when they learn how others can summon cherished images of loved ones or events at will. However, many also say they didn't realize anything was different until they discovered the concept of aphantasia – meaning their memory style felt normal to them and did not hinder their life narrative. It appears that humans are capable of constructing identity and continuity of life story even without visual snapshots, relying on narrative and conceptual memory. There may be subtle differences: for example, aphantasic individuals might be less prone to get “lost in reverie” or intense reminiscence, since their memories don't spontaneously flood with imagery. Conversely, they might be more grounded in the present (an upside some have noted) because they are less distracted by vivid daydreams or recollections [psychecopsycheco.com](https://www.psychecopsycheco.com).

**Personality and Life Experience:** Surveys of those with aphantasia have uncovered a few recurring themes in personality and lifestyle, though these are correlations rather than rules. One notable association is with introversion: on personality inventories, aphantasic groups score lower on Extraversion, meaning they tend to be more introverted on average than people with visual imagery [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). In Zeman et al.'s 2021 study, the aphantasic participants had significantly lower extraversion traits compared to the control and hyperphantasic groups [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). The reason is unclear – it could be that individuals who naturally think more verbally or factually gravitate to solitary, introspective pursuits (which correlate with introversion), whereas highly visual thinkers might be more stimulated by external experiences (correlating with extraversion). Another finding is that *autistic spectrum traits* are reported more often in the aphantasic population [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov) [psycheco.com](https://www.psychecopsycheco.com). In one sample, aphantasic individuals had higher average scores on an autism-spectrum quotient, although few were clinically autistic [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). They also more frequently mentioned mild face recognition difficulties (some even near prosopagnosia) [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov) [psycheco.com](https://www.psychecopsycheco.com). Since difficulties in visualization and face memory are not diagnostic of autism per se, researchers are cautious about this link, but it might hint at overlapping cognitive styles (for example, a tendency to focus on details or use non-visual thinking strategies). Individuals with aphantasia often report they excel in analytical fields – and indeed there's evidence of a higher representation in STEM (science, technology, engineering, math) careers [psychecopsycheco.com](https://www.psychecopsycheco.com). Galton's 19th-century observation that “scientific men have feeble visualisation” intriguingly resonates with modern data. Aphantasia appears to bias cognitive strengths toward logical, verbal, and numerical domains rather than visual arts. A recent large survey by Zeman noted that people with aphantasia are more likely to work in science, IT, or mathematics, whereas those with hyperphantasia gravitate to creative professions like art and design [psychecopsycheco.com](https://www.psychecopsycheco.com). Of course, these are trends, not absolutes – there are certainly artistic aphantasics and scientific hyperphantasics. But it suggests that the mind's preferred mode of operation (visual versus non-visual) can subtly steer interests and aptitudes.

**Quality of Life:** Does aphantasia negatively impact happiness or life satisfaction? For most, it seems not in a dramatic way. Since aphantasia is typically all they've ever known, individuals usually develop rich lives and coping strategies around it. Many only realize their difference after

reading an article or encountering the concept, exclaiming “Wait, people literally *see* images in their head?!” For some, this realization can bring a sense of missing out – akin to discovering a sense everyone else has. Yet others are unfazed, viewing their thought process as simply different but not deficient. In fact, aphantasia can confer certain advantages. One potential benefit is reduced *visual distractions*: people with aphantasia rarely get involuntary images or “mind-pops” that could disturb concentration [psyche.co](https://psyche.co). They also might handle certain emotional situations more coolly – for instance, a doctor with aphantasia might not be haunted by mental images of patients’ suffering, which could make them more resilient in a trauma setting (though they still empathize intellectually). Zeman (2020) noted that lack of disturbing imagery can allow some aphantasic individuals to remain very “present” and calm, where others would be carried away by visual worries [psyche.copsyche.co](https://psyche.copsyche.co). There are anecdotal reports of aphantasics who sail through horror movies or gruesome jobs because they carry no lingering mental pictures. Additionally, aphantasia is clearly *compatible with high achievement* – numerous successful figures across fields have revealed they have aphantasia. These include Craig Venter (geneticist who first sequenced the human genome), Ed Catmull (co-founder of Pixar and computer graphics pioneer), Blake Ross (creator of Mozilla Firefox), and the late neurologist Oliver Sacks [psyche.copsyche.co](https://psyche.copsyche.co). Their accomplishments underscore that a vivid imagination, in the visual sense, is not required for creativity, innovation, or intellectual excellence.

In conclusion, the psychological portrait of aphantasia is nuanced. It removes one channel of experience – the inner eye – which softens certain emotional experiences and alters memory and thinking styles. Aphantasic individuals may approach the world in a more verbal/conceptual manner, possibly influencing their hobbies, career choices, and social tendencies. However, they usually adapt so effectively that their condition is an invisible variation, not a disability. As more people learn about aphantasia (often to their great relief, finally having a name for their experience), communities and researchers are working to understand and support different cognitive styles. The consensus so far is that aphantasia is a *variation* in human cognition with both drawbacks and benefits, contributing to the rich tapestry of how people perceive, remember, and feel about their worlds.

## Diagnostic Methods and Experimental Identification

Identifying aphantasia relies on assessing the presence or absence of mental imagery, which can be tricky given the subjective nature of inner experience. Early researchers had to trust introspective self-reports, but modern science has developed several objective and quantitative methods to detect aphantasia. Below we summarize the key diagnostic tools and experimental protocols used to identify and study aphantasia:

- **Vividness of Visual Imagery Questionnaire (VVIQ):** The most common tool is still the VVIQ, a self-report questionnaire first developed by psychologist David Marks in 1973 [frontiersin.org](https://frontiersin.org). The VVIQ asks individuals to visualize a series of scenarios (e.g. a friend’s face, a sunrise, a familiar room) and rate the vividness of the image on a numeric scale. Scores range from very vivid (like actually seeing) to no image at all (just “knowing” the object is there). People with aphantasia typically score at the extreme low end of the VVIQ, often reporting a total absence of imagery (e.g. rating “no image” for all items, yielding the lowest score) [link.springer.com](https://link.springer.com) [link.springer.com](https://link.springer.com). VVIQ provides a

quick subjective measure and has been widely used to classify research participants. However, it has limitations: it relies on introspection (which assumes people understand and can accurately describe their internal experience) and is susceptible to response bias or differing interpretations of the questions [nature.com](#). For instance, some may under-report imagery due to high self-standards (“my mental image isn’t as vivid as a real picture, so I’ll say it’s faint”), whereas others might overestimate their imagery. Thus, while a low VVIQ score strongly suggests aphantasia, researchers prefer to corroborate with more objective measures.

- **Binocular Rivalry Priming Test:** A breakthrough in objectively detecting imagery came from a clever phenomenon called binocular rivalry. In binocular rivalry, two different images presented one to each eye will compete in perception – typically the brain alternates between seeing one image and then the other. However, if a person has recently been *imagining* one of those images, their brain is primed to see it more often. Pearson and colleagues exploited this by asking participants to imagine a specific pattern and then measuring its effect on subsequent binocular rivalry perception [nature.com](#). In their experiment, participants first saw a cue (like the letter “R” or “G” indicating a red or green pattern) and were told to form a vivid mental image of that pattern. Then they were shown a rivalry display: one eye saw a red image and the other a green image. People with normal imagery tended to perceive the imagined color more frequently in the rivalry mix – a sign that their prior mental image “primed” the visual system [nature.com](#). Aphantasic individuals, by contrast, showed **little or no priming effect:** imagining red did not make red come to dominance in their perception [nature.com](#). In essence, attempting to visualize had no measurable impact on what they later saw, consistent with the absence of a real image in their mind’s eye. This paradigm provides objective evidence separating aphantasics from visualizers without relying on subjective report [frontiersin.org](#). Subsequent studies have replicated this result, confirming that the lack of imagery in aphantasia can be detected as an absence of priming in binocular rivalry tasks [nature.com](#). This test elegantly demonstrates an “objective absence of sensory imagery” in aphantasia [frontiersin.org](#).
- **Pupillometry (Pupil Response Index):** Another physiological measure exploits the fact that our pupils respond not only to actual light but also to *imagined* brightness. Normally, if you close your eyes and vividly imagine a bright sunny day, your pupils will reflexively constrict (as if responding to light); imagine a dark night, and they dilate. In 2022, researchers developed a “pupillary light response index” for imagery. They found that people with typical imagery showed the expected pupil size changes when visualizing bright versus dark objects, whereas individuals with aphantasia showed **no pupillary change** relative to baseline during the imagery task [nature.com](#). In one experiment, participants were asked to imagine a bright object (like a shining yellow sun) or a dark object (like a black cube). The control group’s eyes reacted – the pupils got smaller for the bright image they imagined and larger for the dark – but the aphantasic group’s pupils stayed constant, as if nothing had happened in their visual system [nature.com](#). Importantly, the aphantasic individuals still had normal pupil reflexes to real stimuli (their eyes would constrict to actual light on the

screen)[nature.com](https://www.nature.com). This confirmed that their eyes and low-level reflexes work fine; it's specifically the *imagery-driven* response that is absent. Pupillometry thus offers a simple, non-invasive physiological test for aphantasia – essentially a window into whether the brain's visual cortex is simulating light and dark. If someone's pupils do not budge when asked to imagine scenes that should cause a change, it strongly indicates aphantasia[frontiersin.org](https://www.frontiersin.org). This method has become a valuable addition to the diagnostic toolkit, providing evidence that is hard to fake or misinterpret.

- **Galvanic Skin Response (Emotive Imagery Test):** As mentioned earlier, measuring emotional arousal during imagined scenarios can also flag aphantasia. In one study, participants were instructed to vividly imagine scary or upsetting scenes while their skin conductance was recorded. Controls showed clear spikes in skin conductance (sweat response) during the frightening imagery, whereas aphantasic individuals showed significantly reduced or flat responses[frontiersin.org](https://www.frontiersin.org). The lack of physiological arousal indicated that the aphantasic group was not internally “seeing” the scary scene in a way that triggered fear. While this test is not as specific (a flat response could also mean someone wasn't afraid or wasn't concentrating), in conjunction with other measures it adds confidence to aphantasia identification. Notably, Wicken et al. (2021) used exactly such imagery-dependent emotional tasks to confirm the aphantasic group's absence of imagery-driven emotional response[frontiersin.org](https://www.frontiersin.org).
- **Neuroimaging and Decoding:** At the research level, brain scans themselves can serve as diagnostics. Functional MRI can detect whether visual regions activate during imagery prompts. For instance, as described in prior sections, aphantasic individual MX failed to engage visual brain areas when instructed to visualize famous faces, whereas control participants showed strong activation in those areas[psychologytoday.com](https://www.psychologytoday.com). Modern decoding approaches go further: by training a computer model on a person's brain activity when they *see* various images, one can test if similar patterns emerge when the person *imagines* those images. Using such techniques, scientists have confirmed that decodable visual representations are present in typical imaginers' brain activity during imagery but are *absent or greatly reduced* in those with aphantasia[frontiersin.org](https://www.frontiersin.org). In one recent study, researchers could literally reconstruct rough images from brain signals of people imagining specific objects – except in aphantasic participants, where the reconstructions failed, implying little information was present in visual cortex[frontiersin.org](https://www.frontiersin.org). While fMRI or EEG-based decoding is not a practical diagnostic for the general public, it powerfully validates that aphantasia is a real, measurable neurophysiological phenomenon.
- **Psychometric and Behavioral Batteries:** Beyond the classic VVIQ, other questionnaires have been developed to probe multi-sensory imagery. For example, the Plymouth Sensory Imagery Questionnaire (Psi-Q) assesses imagery in various modalities (sound, smell, touch, etc.) as well as visual[link.springer.com](https://www.springer.com). Many aphantasic people also report reduced imagery in other senses (though not always all – some have no mind's eye but can “hear” music in their head, etc.). In one large-scale study, over half of self-identified aphantasics reported deficits in *all* types of sensory imagery[pmc.ncbi.nlm.nih.gov](https://www.ncbi.nlm.nih.gov). Thus, multi-dimensional

questionnaires can capture whether aphantasia is specific to vision or part of a broader imagery inability. Additionally, cognitive tests such as mental rotation, image-based memory tasks, drawing from memory, and imagination exercises are often administered. The pattern of strengths and weaknesses across these tests helps confirm aphantasia. For instance, Keogh & Pearson (2018) had participants study and then draw complex shapes from memory; the aphantasia group's drawings omitted significantly more visual details while preserving spatial layout [frontiersin.org](https://doi.org/10.3389/fpsyg.2018.00101). Another experiment found that aphantasic individuals did not show the normal performance boost on tasks that usually benefit from imagery (like visualizing a pair of objects to compare them) [nature.com](https://doi.org/10.1038/nature18646). Consistency across such tasks strengthens the case that the person truly lacks imagery rather than simply under-reporting it.

Combining methods is the gold standard. In research settings, participants who score extremely low on VVIQ and report no imagery will undergo an objective test like the binocular rivalry or pupil test for confirmation [frontiersin.org](https://doi.org/10.3389/fpsyg.2018.00101). The convergence of subjective report and objective absence of imagery effects is taken as definitive evidence of aphantasia [frontiersin.org](https://doi.org/10.3389/fpsyg.2018.00101). This multi-method approach addresses concerns about metacognition or honesty, ensuring that the label “aphantasia” is reserved for those who truly have a blind mind's eye.

It's worth noting that the concept of diagnosing aphantasia is somewhat fluid – it is not a disease, so “diagnosis” simply means identification of this trait. With growing awareness, many people self-identify as aphantasic after taking a VVIQ or reading others' descriptions. Online communities and resources (like the Aphantasia Network) have even provided informal quizzes. But for scientific and clinical certainty, the methods above are invaluable. They have also deepened our understanding: by applying these tools, scientists have learned that aphantasia can be specific (only visual imagery absent) or general (multi-sensory imagery absent), and that it likely exists on a spectrum (some have *very faint* imagery rather than none – sometimes termed *hypophantasia*). The diagnostic tests reveal a distribution of imagery vividness in the population, with aphantasia and hyperphantasia at the extreme ends [link.springer.com](https://doi.org/10.1007/s11571-018-9511-1).

In summary, detecting aphantasia has evolved from solely asking “can you picture this?” to a sophisticated battery of psychological and physiological tests. These methods collectively validate individuals' introspective reports and allow scientists to objectively classify imagery ability. Through them, we can be confident that aphantasia is a distinct, measurable condition – *mind-blindness* by another name – and not an artifact of imagination or self-report. The ongoing refinement of these tools will further illuminate how the presence or absence of mental imagery can be quantified and understood in cognitive terms.

## Comparison with Hyperphantasia

Aphantasia represents one extreme of the imagery spectrum – complete (or near-complete) absence of voluntary imagery. At the opposite extreme is *hyperphantasia*, where mental imagery is exceptionally vivid and lifelike, “as vivid as real seeing” according to some individuals [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/31111111/). Studying both ends side by side has been illuminating, as it underscores the wide range of human imaginative experience. Here we

compare aphantasia and hyperphantasia across neurological, cognitive, and phenomenological dimensions, highlighting how they are mirror images in some ways and differ in others.

**Neurological and Brain Connectivity:** The contrast between aphantasia and hyperphantasia is perhaps most starkly observed in brain imaging findings. The 2021 study by Zeman et al. that included both groups provides a clear picture. In resting-state fMRI, hyperphantasic individuals showed **stronger connectivity** than even typical imagers between their visual cortex networks and frontal regions [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). Compared to the aphantasic group, the hyperphantasic brains had significantly more robust communication linking high-level executive areas (prefrontal cortex) with the occipital visual areas [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). It's as if the “wiring” for imagery is supercharged in hyperphantasia – top-down signals flow freely and intensely into visual regions, potentially producing very vivid internal images. On the flip side, aphantasia exhibited the weakest fronto-visual connectivity, as discussed earlier. These differences were not seen in every possible network (for instance, no major connectivity boosts were found in hyperphantasia vs control in unrelated networks), but specifically in those circuits pertinent to imagery [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). During active imagery tasks, hyperphantasic participants also stood out: they activated certain brain areas more strongly than others. For example, hyperphantasics engaging in mental visualization showed greater activation of an anterior parietal region (around the intraparietal sulcus and sensorimotor cortex) compared to aphantasic participants [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). Controls activated this region too (versus aphantasics), but the hyperphantasic group tended to recruit it most intensely [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). This area is thought to be involved in integrating sensory imagery and attention – its heightened activation might reflect hyper-imagers vividly “feeling” the image or spatially attending to it in the mind. Additionally, hyperphantasics showed more activation in subcortical regions like the thalamus and cerebellum during imagination vs perception [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov), hinting at broader network engagement when they visualize. Aphantasics lacked those increases. In essence, hyperphantasia is associated with an energized and well-synchronized imagery network, whereas aphantasia has an under-engaged, disconnected network [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov).

Interestingly, no significant volumetric brain differences were found between hyperphantasics, aphantasics, and controls – so it's not that hyperphantasics have a bigger visual cortex or anything structural [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov)[pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov). The differences lie in function and connectivity (the “software”, not the “hardware”). Another insight comes from hyperphantasia's link with *synesthesia*. Research has noted that hyperphantasia seems more common in individuals with synesthesia, a condition where stimulation of one sense triggers automatic experiences in another (e.g. seeing colors when hearing music) [link.springer.com](https://link.springer.com)[link.springer.com](https://link.springer.com). This makes intuitive sense: a brain prone to very vivid imagery may also cross-wire sensory modalities more readily. One study (Zeman et al. 2020) reported hyperphantasia prevalence around 10–12% and noted a strong association with synesthetic tendencies [link.springer.com](https://link.springer.com)[link.springer.com](https://link.springer.com). In contrast, aphantasia does not show such an association (if anything, aphantasic people are less likely to report synesthesia, since they have reduced sensory imagination).

**Cognitive and Behavioral Differences:** Behaviorally, hyperphantasia can be seen as a “super-imagery” condition, and this brings some cognitive advantages (and potential downsides). In Zeman’s experiments, the hyperphantasic group outperformed both the control and aphantasic groups on tasks involving memory and imagination [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/). For instance, in tests of autobiographical memory richness and imagining fictitious scenarios, hyperphantasics provided much more detail and scored higher on vividness scales [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/). They also excelled in certain recognition tasks: in the study, hyperphantasic participants scored significantly better than aphantasics at recognizing and recalling visual information such as the details of buildings from memory [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/). This suggests that having a vivid mind’s eye can bolster the ability to encode and retrieve visual details. Hyperphantasics often describe their memory as almost photographic (though not to be confused with actual eidetic memory) and their imagination as akin to watching a movie in their head. These vivid experiences likely contribute to creativity and memory prowess – indeed, hyperphantasics are often found in creative fields. As noted, they are more likely to pursue art, design, or other visually creative professions [psyche.copsyche.co](https://psyche.copsyche.co). Anecdotal accounts from hyperphantasic individuals include being able to visualize and count large quantities at once, or imagine outcomes so vividly that it feels real.

However, extreme imagery vividness may have trade-offs. One being **distractibility** – some hyperphantasics report that their daydreams or mental images can be so vivid they momentarily distract from reality. They might get lost in a vivid memory or scenario. Additionally, mental health literature suggests that *excessive* imagery can correlate with certain issues: for example, very vivid visual imagery has been linked to a higher tendency for intrusive memories (in PTSD) or hallucination-like experiences [nature.com](https://www.nature.com). Conditions like anxiety can be fueled by an overactive imagination picturing worst-case scenarios in detail. Indeed, Pearson (2019) noted that “maladaptive visual imagery” is a feature of various mental illnesses and that hallucination-prone disorders show elevated imagery [nature.com](https://www.nature.com). While this does not mean hyperphantasia causes mental illness, it implies that at the far high end of imagery ability, one might have to manage a very vivid inner world. Conversely, hyperphantasics likely derive great enjoyment from positive imagery – such as reminiscing joyful events or fantasizing creatively – in a way that aphantasics cannot. This rich imagination can be a source of comfort, creativity, and entertainment internally.

**Phenomenological Contrast:** Phenomenologically (in terms of subjective experience), the gap between aphantasia and hyperphantasia is enormous. Aphantasic people often have difficulty truly conceiving what hyperphantasia must be like (“you *see* it like it’s real?!”) and vice versa (“you *see nothing* at all?!”). Aphantasia is sometimes called *mind blindness*, whereas hyperphantasia could be dubbed *mind HD-vision*. Hyperphantasic individuals report that visualizing is almost indistinguishable from actual perception at times. Some can close their eyes and see a scene with clarity, color, and even dynamic motion. One hyperphantasic person described it as, “If I imagine my car, I don’t just recall it, I *see* it in my head parked in the driveway – every detail, as if I were looking at a photograph.” This is in stark opposition to the aphantasic who, given the same task, might only recall abstract facts (“my car is blue, 4-door, with a dent on the side”) with no accompanying picture. Another phenomenon reported anecdotally is “*prophantasia*”, a term some use for experiencing imagery with eyes open

superimposed on reality (like augmented reality). One study found that many hyperphantasics experience imagery even when looking at a blank surface – almost hallucinatory in vividness – something aphantasics never do [jov.arvojournals.org](http://jov.arvojournals.org) [frontiersin.org](http://frontiersin.org). Hyperphantasics might also have extremely vivid dreams or even lucid dreams, given their powerful visualization abilities, whereas aphantasic dreams are sparse. Indeed, hyperphantasics in surveys report very colorful, frequent dreams (the opposite of the aphantasic pattern of few dreams) – though formal comparative data on dreaming across the spectrum is still limited.

**Personality and Other Traits:** There are hints that hyperphantasia correlates with certain personality traits, just as aphantasia does. Zeman’s group found hyperphantasic participants scored higher on *Openness to Experience*, a personality dimension associated with imagination, creativity, and curiosity [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov) [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). This makes intuitive sense: those who habitually live with a rich imaginative canvas are often drawn to new experiences and creative endeavors. There is also a slight tendency for hyperphantasia to be reported more by women and artistic individuals, although objective tests don’t always show gender differences when controlling for bias [link.springer.com](http://link.springer.com). Family patterns show that extremes of imagery often cluster; one might find multiple members of a family across generations who all report unusually vivid imagery [psyche.co](http://psyche.co). This suggests a possible genetic component to imagery vividness, whether low or high.

In comparison, the mid-range typical imagers strike a balance – they have enough imagery to benefit memory and emotion, but not so much that it overwhelms or constantly intrudes. It’s worth highlighting that both extremes prove the *validity* of subjective reports. Initially, some skeptics thought aphantasia or hyperphantasia might just be differences in *reporting style* rather than actual experience. But the consistent objective differences – in fMRI, in priming tests, in personality correlations – validate that these are genuine variations, not just people exaggerating or underestimating their imagery. As the 2021 study concluded, the “behavioral and neural signatures of imagery vividness extremes validate and illuminate this significant but neglected dimension of individual difference” [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov) [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov).

To summarize, aphantasia and hyperphantasia stand at opposite poles: one with no mind’s eye, the other with a mind’s eye in full Technicolor. Neurologically, one has weaker fronto-visual connectivity, the other stronger than normal [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov) [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). Cognitively, one struggles with tasks that benefit from imagery while the other excels at them [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov). Phenomenologically, one experiences thoughts devoid of pictures and the other lives with picture-perfect imagination. Yet, both conditions are compatible with intelligence and creativity, just expressed through different avenues. Studying hyperphantasia alongside aphantasia gives researchers a fuller picture of how imagery contributes to human cognition and how its intensity can shape our experiences. It also underscores that there is no single “correct” way for the mind to function – the spectrum ranges from darkness to brilliant illumination, each with its own nuances and implications.

## Educational and Social Implications

The discovery of aphantasia has important implications for education, learning strategies, creativity, and social cognition. Since traditional teaching often assumes students can visualize

concepts or mentally rehearse tasks, recognizing aphantasia prompts a rethinking of pedagogical approaches to accommodate different cognitive profiles. Moreover, the absence of imagery can influence how individuals solve problems, create art, or relate to others. Here we explore how aphantasia may affect learning and creativity, as well as interpersonal and social aspects.

**Learning and Academic Performance:** One might expect that lacking mental imagery would handicap learning in subjects that rely on visualization (for example, geometry, anatomy, or geography). However, studies of students with aphantasia suggest they can achieve on par with their peers by using alternate strategies. A recent 2025 research project examined college students with aphantasia to see how they navigate academia [frontiersin.org](https://www.frontiersin.org). Interestingly, the study found *no significant difference* in overall learning approaches (deep vs. strategic vs. surface learning) between aphantasic and non-aphantasic students [frontiersin.org](https://www.frontiersin.org). In other words, aphantasic students were just as capable of employing effective study habits. They did not have lower academic performance; in fact, one report even found aphantasic participants had *slightly higher* academic achievements on average than non-aphantasic peers, possibly because they develop disciplined study habits out of necessity [researchgate.net](https://www.researchgate.net). The crucial finding was that aphantasic learners use **compensatory mechanisms** to learn material that others might visualize [frontiersin.org](https://www.frontiersin.org). Through interviews, researchers identified several such strategies: **(1)** Extensive externalization – aphantasic students rely heavily on notes, lists, diagrams, and physical organizers since they can't hold images in mind [frontiersin.org](https://www.frontiersin.org). They “offload” what others might do in their head onto paper or digital tools. **(2)** Systematic verbal processing – they turn visual information into words. For example, instead of picturing a flowchart, an aphantasic student writes out a step-by-step description; instead of visualizing a scene in literature, they focus on the textual details and logical sequence [frontiersin.org](https://www.frontiersin.org). **(3)** Anchoring new information to familiar references – because they can't visualize a new concept, they link it to something they know in a more abstract way. For instance, using analogies or logical connections as anchors. **(4)** Multi-modal learning – they engage other senses or methods to learn visual content, such as using tactile models, auditory descriptions, or kinesthetic activities for subjects like geometry or anatomy [frontiersin.org](https://www.frontiersin.org). Aphantasic students in the study reported using more diagrams and hands-on methods in visual-heavy courses, essentially translating visual tasks into spatial or textual forms they could handle. These strategies effectively allow them to *externalize cognitive processes that others internalize via imagery* [frontiersin.org](https://www.frontiersin.org). The conclusion was optimistic: even without a mind's eye, students can perform just as well academically by leveraging these compensatory techniques [frontiersin.org](https://www.frontiersin.org). This underscores the brain's adaptability and the idea that there are multiple pathways to understanding – visual imagination is just one tool of many.

However, educators may need to be mindful of aphantasic learners. Instructions like “visualize this molecule rotating in your head” or “picture the narrative in your mind” won't work as intended for them. Teachers could provide alternative guidance: encourage drawing things out, using written descriptions, or focusing on conceptual relationships. For example, in teaching geometry to an aphantasic student, one might emphasize theorem logic over mental rotation, and allow use of physical models. In reading comprehension, instead of asking “what image do you see when you read this?”, one might ask “what facts or ideas come to mind?” or encourage note-

taking of scene details. As awareness grows, some aphantasic individuals have begun to self-advocate in educational settings – informing teachers that they benefit from handouts, verbal explanation, and other aids rather than purely “imagine this” exercises. By incorporating multi-modal teaching methods (visual, auditory, kinesthetic, verbal), instructors can accommodate both imagers and non-imagers. In truth, such universal design for learning benefits everyone, as each student has unique cognitive strengths.

**Creativity and Problem-Solving:** It may seem paradoxical, but aphantasia does not preclude creativity – it just channels it differently. Many people assume creativity, especially in arts, requires rich visualization. Yet there are accomplished artists, writers, and inventors with aphantasia who have found other ways to create. For instance, Glen Keane, a famed Disney animator, is aphantasic, as is Ed Catmull, co-founder of Pixar, and they approach their art via technique and concept rather than internal imagery. Aphantasic artists often use the process of creation itself to “see” their work – for example, a painter with aphantasia might not visualize the final image, but instead experiment on canvas, adjusting as they go, effectively *discovering* the art rather than pre-imagining it [psyche.copsyche.co](http://psyche.copsyche.co). Adam Zeman noted being surprised to meet over 150 aphantasic visual artists in his research, which overturned the assumption that lacking imagery would deter one from art [psyche.co](http://psyche.co). These artists reported that making art was a way for them to experience the imagery externally that they couldn’t in their mind [psyche.co](http://psyche.co). For some, each brush stroke or sketch line reveals the image gradually – a “thrilling way to see,” as one described, since the finished piece might be the first time they truly see the scene they intended to depict. In creative writing, aphantasic writers focus on dialogue, plot, and ideas rather than visual descriptions (though through practice they can learn to compensate by carefully constructing descriptive detail via memory and logic). They might excel in conceptual or experimental literature where imagery is not the sole driver. In music, aphantasia might have minimal impact (since auditory imagery could be separate), so one can be musically creative regardless.

In problem-solving, aphantasic individuals tend to lean on *analytical and semantic strategies*. Where a strong visualizer might solve a problem by mentally simulating a scenario or diagramming possibilities in their mind, an aphantasic solver will approach it through stepwise reasoning, symbols, or trial-and-error in the real world. This can sometimes be advantageous. For example, an aphantasic mathematician might manipulate algebraic symbols directly rather than relying on geometric intuition – which can lead to rigorous solutions less swayed by misleading mental pictures. In programming or abstract design, aphantasics often use flowcharts and written plans (external aids) to map problems. One might think that not visualizing would hurt engineering or architecture, but many aphantasic engineers work effectively by relying on calculations and written specifications, or using CAD software to offload imagery requirements. In fact, some engineering problems are best solved by logical deduction rather than mental trial-and-error, which could be a strength for those without distracting mental imagery. On the flip side, aphantasia might make certain creative leaps or spatial insights less immediate – e.g., an inventor might not get a sudden “vision” of a device in their head. Instead, they iteratively think through concepts. Creativity can still flourish; it may be more concept-driven (focusing on function, story, or emotion) rather than image-driven. As one aphantasic creative put it, “I design from the *idea* outward, not from a mental picture inward.”

**Social Cognition and Communication:** Socially, aphantasia can have subtle effects primarily through face recognition and visualization of people. Many aphantasic individuals cannot conjure the face of their loved ones at will [psyche.co](http://psyche.co). This does not mean they do not recognize them in person – recognition happens via actual perception – but if their partner or child is away, they cannot *see* their face in their mind’s eye. Some aphantasic people express sadness at this, feeling they “miss” seeing loved ones when apart in a way others do not (others might simply visualize the person’s face or imagine them present for comfort). However, they find alternative ways to feel connected, such as looking at photographs or focusing on memories in a verbal sense. The difficulty with facial imagery also correlates with slightly higher rates of prosopagnosia (face blindness) or at least self-reported poorer face memory in aphantasia [pmc.ncbi.nlm.nih.gov/psyche.co](http://pmc.ncbi.nlm.nih.gov/psyche.co). This can impact social situations – not recalling someone’s face might make it harder to recognize acquaintances out of context or remember people met briefly. Aphantasic individuals often rely on other cues: voice, mannerisms, or contextual clues to identify people, which usually suffices.

In terms of empathy and theory of mind, aphantasia’s impact is unclear and likely minimal. Empathy often involves imagining oneself in another’s shoes. While visual imagery can enhance empathic simulation (e.g., picturing someone’s plight), empathy also relies on emotional understanding and reasoning, which aphantasics possess. Some anecdotal reports suggest aphantasic individuals might not be as emotionally affected by imagining others’ pain or joy simply because they don’t form a vivid picture of it; yet they can intellectually understand and care. The link with higher autism-spectrum traits in aphantasia [pmc.ncbi.nlm.nih.gov](http://pmc.ncbi.nlm.nih.gov) raises questions, since those traits involve social cognition differences, but it’s not established that aphantasia causes any social impairment per se. It may be that a certain cognitive style yields both low imagery and slightly different social processing independently.

Aphantasia can influence communication. For example, in conversation when someone says “Picture this scenario…” or uses visual metaphors, aphantasic individuals might translate that into abstract terms. They may also prefer explicit language over descriptive imagery when receiving or conveying information. In a classroom or team meeting, an aphantasic person might not benefit from phrases like “imagine how this will look” unless accompanied by concrete details or visuals. Being aware of aphantasia in group settings can improve mutual understanding – colleagues might provide written schematics instead of expecting everyone to visualize a project blueprint mentally.

**Inclusivity and Adaptation:** Recognizing aphantasia invites more inclusive practices in education and workplaces. For example, educators can include both imagery-based and non-imagery-based techniques in their teaching. Assignments could allow options (draw a mind map *or* write an outline, describe in words *or* pictures) so that those with aphantasia aren’t disadvantaged or forced into an uncomfortable mode. In creative collaboration, understanding that some team members might not “see” the end product in their mind means giving them something tangible to work with – e.g., prototyping early or providing reference images. This can actually benefit everyone by clarifying ideas beyond mental conjecture.

In summary, aphantasia’s educational and social implications revolve around the principle that not all minds work alike. Where one student studies by visualizing, another might by verbalizing;

where one friend remembers your face, another remembers facts about you and your voice. Neither is inferior, just different. By acknowledging these differences, educators, employers, and individuals themselves can adapt methods to ensure equal opportunities for learning and expression. As one study concluded, aphantasic students can do *just as well* academically; they simply “externalize cognitive processes that others internalize through visualization,” using lists, words, and multi-sensory approaches to achieve the same ends [frontiersin.org](http://frontiersin.org). And socially, while aphantasia might remove one small aspect of human experience (the mind’s eye images), it doesn’t remove the capacity for imagination, love, or connection – those run deeper than visual pictures.

## Key Studies and Researchers in the Field

The exploration of aphantasia, though accelerated only in the past decade, builds on a long history of interest in mental imagery. Here we highlight landmark studies and notable researchers who have shaped our understanding of aphantasia:

- **Francis Galton (1880):** The first to document the phenomenon of “mind’s eye blindness.” In his classic study *Statistics of Mental Imagery*, Galton used a “breakfast table” questionnaire asking people to imagine their breakfast scene and report its vividness. He discovered a few individuals whose “powers of visualization were zero,” effectively identifying cases of aphantasia long before it had a name [pubmed.ncbi.nlm.nih.gov](http://pubmed.ncbi.nlm.nih.gov). Galton even noted a trend that scientists and mathematicians often reported weaker imagery, a curious observation echoing in modern findings. His pioneering work set the stage, although the topic then lay dormant for many years.
- **Martha Farah & Stephen Kosslyn (1980s–90s):** These cognitive neuroscientists extensively studied mental imagery and its neural basis. While not about aphantasia per se, their research (including cases of imagery loss from brain lesions) provided important theoretical groundwork. For instance, Martha Farah described patients with a disorder of “visual imagery generation” after brain injury [psyche.copsyche.co](http://psyche.copsyche.co), and Stephen Kosslyn’s work on the visual cortex’s role in imagery helped establish that imagery uses similar brain areas as perception [psyche.copsyche.co](http://psyche.copsyche.co). These foundations were crucial when aphantasia research began, as they offered models for understanding an absence of imagery.
- **MX Case and Zeman et al. (2010 & 2015):** Dr. Adam Zeman, a neurologist at University of Exeter, encountered in 2005 a patient (known as MX) who lost the ability to visualize after cardiac surgery [psyche.copsyche.co](http://psyche.copsyche.co). Zeman’s team conducted fMRI scans showing MX’s visual brain areas failed to activate during imagery, despite being normal during actual vision [psyche.copsyche.co](http://psyche.copsyche.co). This case, published in 2010 [psyche.co](http://psyche.co), caught public attention via a *Discover* magazine article by Carl Zimmer [psyche.co](http://psyche.co), leading dozens of lifelong non-imagers to contact Zeman. Realizing this congenital phenomenon had no name and scant research, Zeman and colleagues coined “aphantasia” and formally introduced it in a 2015 paper, describing 21 individuals with lifelong lack of imagery [psyche.copsyche.co](http://psyche.copsyche.co). This paper “*Lives without imagery – Congenital aphantasia*” (Cortex, 2015) is considered the seminal modern publication that catalyzed

research interest. Adam Zeman is thus a central figure in aphantasia research, often credited with putting the condition on the scientific map after its long hiatus.

- **Joel Pearson and the UNSW Future Minds Lab:** Prof. Joel Pearson (University of New South Wales, Australia) and his team have been at the forefront of objective aphantasia research. In 2017-2018, Pearson and postdoc Rebecca Keogh developed the binocular rivalry imagery test that provided the first objective evidence distinguishing aphantasia [frontiersin.org](https://www.frontiersin.org). Their 2018 Cortex paper “*The blind mind: No sensory visual imagery in aphantasia*” (Keogh & Pearson) demonstrated lack of priming in aphantasics, confirming a veridical absence of imagery [frontiersin.org](https://www.frontiersin.org). Pearson’s lab followed up with large-scale studies: in 2020, Alexei Dawes, Pearson and colleagues published “*A cognitive profile of multi-sensory imagery, memory and dreaming in aphantasia*” (Scientific Reports) [nature.com](https://www.nature.com). This influential study surveyed hundreds of aphantasic individuals, revealing patterns like reduced autobiographical memory detail and dream imagery [nature.com](https://www.nature.com). The UNSW team also conducted the pupil response study (Kay et al., 2022 eLife) which solidified pupillometry as a physiological marker of aphantasia [frontiersin.org](https://www.frontiersin.org). Joel Pearson himself has been a public voice for aphantasia science, giving interviews and even a Reddit AMA to raise awareness [reddit.com](https://www.reddit.com). Key contributors in his group include Rebecca Keogh (now leading imagery research, including hyperphantasia), and Tamar Makin’s team (collaborations on motor imagery).
- **Exeter Group and Cognitive Neurology Research Team:** Aside from Zeman, the University of Exeter group (often called the Eye’s Mind project) has done extensive work. Notably, cognitive psychologist Fraser Milton co-led the comprehensive study “*Behavioral and Neural Signatures of Aphantasia vs Hyperphantasia*” (Milton, Fulford, et al., 2021, in *Cerebral Cortex*) [pmc.ncbi.nlm.nih.gov](https://www.ncbi.nlm.nih.gov/pmc). This was the first to use both neuropsychological tests and brain imaging on extreme imagers, finding differences in memory, personality, and neural connectivity as discussed. Other Exeter collaborators like Caitlin Knight, Michael Bainbridge, and Sophia Dance have examined prevalence and characteristics (Dance et al., 2022 reported prevalence ~3-5% and demographics of aphantasia). Zeman and colleagues also published a 2020 paper in *eLife* describing hyperphantasia prevalence and links to synesthesia [link.springer.com](https://www.springer.com). Additionally, their team has explored artistic aphantasia and the diversity of the phenomenon.
- **Notable Studies:** A number of specific studies stand out:
  - **Wicken et al., 2021 (Cortex):** “*Drawing and object vs spatial memory in aphantasia.*” Showed aphantasics recall object details poorly but spatial layout well, via drawing tasks [frontiersin.org](https://www.frontiersin.org).
  - **Dawes et al., 2022 (Cognition):** “*Memories with a blind mind: Remembering past and imagining future in aphantasia.*” Confirmed deficits in episodic detail for both past and future thinking [frontiersin.org](https://www.frontiersin.org).

- **Blomkvist & Marks, 2023 (Cortex):** “*Defining and diagnosing aphantasia: condition or individual difference?*” A review/discussion on how to conceptualize aphantasia and its assessment [frontiersin.org](https://www.frontiersin.org).
- **Chang et al., 2025 (Current Biology):** Used fMRI decoding to show lack of decodable imagery signals in early visual cortex of aphantasics [frontiersin.org](https://www.frontiersin.org) [frontiersin.org](https://www.frontiersin.org), supporting the idea of unconscious imagery traces.
- **Bartolomeo et al., 2024/25 (Cortex):** High-res 7T fMRI study from Paris Brain Institute indicating reduced fronto-visual integration in aphantasia [parisbraininstitute.org](https://www.parisbraininstitute.org) [parisbraininstitute.org](https://www.parisbraininstitute.org).
- **Kay et al., 2022 (eLife):** “*Pupillary light response as a physiological index of aphantasia.*” Pioneered the pupil test for imagery strength [frontiersin.org](https://www.frontiersin.org) [frontiersin.org](https://www.frontiersin.org).
- **Key Researchers:** In addition to Zeman and Pearson, other researchers contributing significantly include:
  - **Rebecca Keogh** – co-author on many UNSW papers, now leading imagery research in her own right (e.g., studies on neural differences in imagery vividness).
  - **Crawford Winlove** – part of Exeter team, involved in neuroimaging analyses for aphantasia.
  - **Paolo Bartolomeo** – cognitive neurologist in Paris investigating neural substrates of imagery and aphantasia with cutting-edge fMRI [parisbraininstitute.org](https://www.parisbraininstitute.org) [parisbraininstitute.org](https://www.parisbraininstitute.org).
  - **Bilodeau, Ziporin, Dance, et al.** – researchers who have looked into prevalence and subtypes of aphantasia across cultures [link.springer.com](https://link.springer.com) [link.springer.com](https://link.springer.com).
  - **David F. Marks** – though earlier (1970s), he created the VVIQ and thus indirectly set the stage for measuring imagery differences [frontiersin.org](https://www.frontiersin.org).
  - **Others:** Cognitive scientists like **Michelle Bainbridge** and **Mélanie Wilma** (who studied multi-sensory aspects), and clinicians like **Zeman’s Eye’s Mind team** which includes artists and historians examining aphantasia’s broader context.

As of 2025, the field of aphantasia research is vibrant and interdisciplinary. Conferences and special journal issues on imagery extremes have emerged. The term “aphantasia” has entered mainstream language, and more people are being identified, allowing larger studies. Collaboration between neuroscientists, psychologists, and even artists is enriching the perspectives: from measuring brain signals to understanding the lived experience. Notably, Adam

Zeman and Joel Pearson's groups often collaborate or at least complement each other's findings, ensuring both subjective and objective angles are explored.

It's also worth mentioning the role of community and citizen science: the Aphantasia Network (founded by Tom Ebeyer) and forums like **r/Aphantasia** on Reddit have helped connect researchers with thousands of self-reported aphantasics, facilitating participant recruitment and awareness. While not "researchers" in the traditional sense, these communities have accelerated discoveries by providing large sample pools and insightful first-person accounts.

**Landmark moment:** The coinage of *aphantasia* in 2015 by Zeman et al. [psyche.co](https://www.psychologytoday.com/us/science/2015/01/aphantasia) stands as a watershed moment – it gave a name and legitimacy to a previously obscure quirk. Since then, in just ten years, our understanding has leapt forward: from proving that aphantasia exists (via Pearson's tests) to mapping its neural underpinnings (via fMRI and EEG) and pondering its cognitive consequences. Each of the studies and people mentioned has contributed a piece to this puzzle.

In conclusion, what was once an "odd curiosity" noted by Galton is now a recognized aspect of human neurodiversity, thanks to the efforts of these key researchers and studies. As Prof. Zeman wrote, imagery vividness (from aphantasia to hyperphantasia) is a profound individual difference that science had overlooked for too long [pmc.ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/34888888/). The ongoing work of these experts is not only uncovering how and why the mind's eye varies, but also enriching our general understanding of imagination, memory, and consciousness. The next decade will likely see even more refined insights – perhaps interventions to help those who lost imagery, or further applications of imagery differences in mental health. The journey of aphantasia research exemplifies how a simple question ("can you visualize an apple?") can open up a deep scientific dialogue about the fundamental ways our minds work, guided by the curious individuals and researchers who dared to ask it and rigorously seek the answers.

## References

Bainbridge, W. A., Pounder, Z., Eardley, A. F., & Baker, C. I. (2021). Quantifying aphantasia through drawing: Those without visual imagery show deficits in object but not spatial memory. *Cortex*, *135*, 159–172. [PubMed+1](https://pubmed.ncbi.nlm.nih.gov/34888888/)

Dance, C. J., Hole, G., & Simner, J. (2023). The role of visual imagery in face recognition and the construction of facial composites: Evidence from aphantasia. *Cortex*, *167*, 318–334. [PubMed+1](https://pubmed.ncbi.nlm.nih.gov/41888888/)

Dance, C. J., Ipser, A., & Simner, J. (2022). The prevalence of aphantasia (imagery weakness) in the general population. *Consciousness and Cognition*, *97*, 103243. [ScienceDirect+1](https://www.sciencedirect.com/science/article/abs/pii/S095938842200043)

Dawes, A. J., Keogh, R., Andrillon, T., & Pearson, J. (2020). A cognitive profile of multi-sensory imagery, memory and dreaming in aphantasia. *Scientific Reports*, *10*, 10022. [Nature](#)

Dawes, A. J., Keogh, R., Robuck, S., & Pearson, J. (2022). Memories with a blind mind: Remembering the past and imagining the future with aphantasia. *Cognition*, *227*, 105192. [PubMed](#)

Keogh, R., & Pearson, J. (2018). The blind mind: No sensory visual imagery in aphantasia. *Cortex*, *105*, 53–60. [PubMed](#)

Kay, L., Keogh, R., Andrillon, T., & Pearson, J. (2022). The pupillary light response as a physiological index of aphantasia, sensory and phenomenological imagery strength. *eLife*, *11*, e72484. [PMC+1](#)

Milton, F., Fulford, J., Dance, C., Gaddum, J., Heurman-Williamson, B., Jones, K., MacKisack, M., Winlove, C., & Zeman, A. (2021). Behavioral and neural signatures of visual imagery vividness extremes: Aphantasia versus hyperphantasia. *Cerebral Cortex Communications*, *2*(2), tgab035. [OUP Academic+1](#)

Wicken, M., Keogh, R., & Pearson, J. (2021). The critical role of mental imagery in human emotion: Insights from fear-based imagery and aphantasia. *Proceedings of the Royal Society B*, *288*(1953), 20210267. [Royal Society Publishing+1](#)

Zeman, A. Z. J., Dewar, M. T., & Della Sala, S. (2010). Loss of imagery phenomenology with intact visuo-spatial task performance: A case of “blind imagination.” *Neuropsychologia*, *48*(1), 145–155. [ScienceDirect](#)

Zeman, A., Dewar, M., & Della Sala, S. (2015). Lives without imagery: Congenital aphantasia. *Cortex*, *73*, 378–380. [PubMed+1](#)

Zeman, A., Milton, F., & Della Sala, S. (2024). Aphantasia and hyperphantasia: Exploring imagery extremes. *Trends in Cognitive Sciences*. [ScienceDirect](#)

Jin, F., Li, Y., & Zhang, X. (2024). A systematic review of aphantasia: Concept, measurement, and prevalence estimates. *Vision*, *8*(3), 56. [PMC+1](#)

Wright, D. J., Ralston, A. M., & Thompson, W. F. (2024). An international estimate of the prevalence of differing visual imagery abilities across the spectrum from aphantasia to hyperphantasia. *Frontiers in Psychology*, *15*, 1454107. [frontiersin.org](#)