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ORIGINAL RESEARCH

Aphantasia, Unsymbolized Thinking and Conscious Thought

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Abstract
According to a common view, conscious thoughts necessarily involve quasi-perceptual experiences, or mental images. This is alleged to be the case not only when one entertains conscious thoughts about perceptible things, but also when one thinks about more abstract things. In the case of conscious abstract propositional thoughts, the idea is that they occur in inner speech, which is taken to involve imagery (typically auditory) of words in a natural language. I argue that unsymbolized thinking and total aphantasia cast doubt on this common view. Unsymbolized thinking is the experience of thoughts that does not involve imagery. Total aphantasia is the inability to produce mental images of all sensory modalities. I consider and reject the objection that these individuals are mistaken either because their thoughts do involve images, or because those thoughts are not conscious. Thus, unsymbolized thinking and aphantasia provide evidence that conscious thoughts can occur without imagery.

Keywords Aphantasia · Consciousness · Mental imagery · Inner speech

1 Introduction

A common view about conscious thoughts is that they necessarily involve mental images. Call this view *Consciousness is Imagistic*, henceforth CI. This view appears, in one form or another, throughout the history of philosophy. Aristotle, for instance, claimed that thought requires images. Hume held that ideas are copies of sensory

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impressions. More recently, the view that conscious thoughts necessarily involve imagery has been defended, for instance, by Carruthers (1996, 2011, 2015), Prinz (2007, 2012) and Heil (2009). Mental images are here taken to be quasi-perceptual experiences, which are similar to perceptual experiences, but which occur in the absence of the relevant external stimuli (Thomas, 2014; Pearson et al., 2015).[1] Thus, in consciously thinking about the smell of garlic, the taste of mangos or the sound and view of a waterfall, one has quasi-perceptual experiences which are similar to the perceptual experiences of actually smelling garlic, tasting a mango, or hearing and seeing a waterfall, but which occur in the absence of the relevant external stimuli. In consciously thinking about what to do on one's next vacation, one forms images, possibly multimodal, of different scenarios in one's mind.

Not all conscious thoughts, though, are clearly captured by images of visual scenes or of tastes. But when it comes to more abstract conscious propositional thoughts, a common idea is that they occur in inner speech, which is also taken to involve mental images, typically auditory images of words in a natural language. In thinking about the philosophy paper you are writing, for instance, you "hear" yourself talk inwardly. According to CI, then, propositional thoughts too can only occur consciously in the form of imagery, namely imagery that figures in inner speech (Carruthers, 2015; Prinz, 2012).

CI has been adopted for conscious thoughts conceived both as phenomenally conscious and as access conscious.[2] It is often claimed that only imagistic thoughts are phenomenally conscious, and that the phenomenology of a thought is constituted solely by the phenomenology of the images present (Prinz, 2012; Carruthers & Veillet, 2011). And it has also been claimed that only thoughts involving images can be access-conscious, in the sense of being available for a wide number of cognitive systems, such as those for reasoning, decision-making, memory formation and verbal report (Carruthers, 2015).[3]

My goal is to challenge the view that conscious thoughts necessarily involve mental images. Access and phenomenal consciousness are not always easily disentangled, but I will be mostly concerned with access-consciousness, and my main claim (in the first 4 sections) is that thoughts can be access-conscious without being imagistic. First, in Sect. 2, I question one common empirical motivation for CI. In Sect. 3, I consider what the psychologist Russell Hurlburt calls "unsymbolized thinking", which is the experience of thoughts that do not involve images or words. In Sect. 4, I consider the case of total aphantasia, a condition in which people are unable to produce mental images. I will argue in these sections that unsymbolized thinking and total aphantasia provide a strong case against CI, conceived as a claim about access consciousness. In Sect. 5, I return briefly to the issue of phenomenal consciousness, arguing against the

[1] This is, I take, the most common conception of mental imagery, and how philosophers and cognitive scientists usually characterize it (cf. also Dawes et al., 2020; Pearson & Westbrook, 2015), as well as the conception behind CI, which is the target of this paper. But see Nanay (2021) for a different conception, according to which mental imagery can be unconscious.

[2] See Block (1995) for the distinction between access and phenomenal consciousness.

[3] Even Prinz, who focuses on phenomenal consciousness, does so just because he thinks that consciousness is always phenomenal, and therefore imagistic, including access consciousness (2012, pp. 5–6).

view that phenomenal consciousness is always imagistic. In sum, conscious thoughts can be non-imagistic.

2 A Worry About One Motivation for CI

One common motivation for CI is that it just seems to us that our conscious thoughts occur in images. Prinz, for instance, says that "introspection suggests that all consciousness is perceptual. (…) Consciousness just seems to be perceptual in nature" (2007, p. 340). Better reasons have also been given though. Both Prinz (2012) and Carruthers (2015) in fact rely on a large body of empirical studies to support their claim. They argue, for instance, that consciousness requires attention (in that only what is attended to can enter working memory and be available to various mental processes), and that attention is a sensory phenomenon, involving signals that are directed exclusively to perceptual areas of the brain. They deny that imageless thoughts can be conscious in part because that would require that attentional signals could be directed to non-sensory areas of the brain, for which, they claim, there is no evidence. Thus Carruthers claims that "attention itself has an exclusively sensory focus" (2015 p. 92) and Prinz says that "everything we know about attention suggests that attention is a perceptual phenomenon" (2007, p. 339).

However, the studies that are typically drawn to support the claim that attentional signals can only be directed to sensory areas of the brain (cf. Carruthers, 2015, pp. 58–64) involve attention to perceptual stimuli. It is unsurprising then that, in the perceptual tasks psychologists employ, attention will involve activation of sensory areas of the brain. The purported lack of evidence that attentional signals can be directed to non-sensory areas, invoked to support CI, might just be a product of the kinds of tasks psychologists use to study attention and working memory. [4] Given that attention is generally studied for its role in perception and perceptual working memory tasks, it is questionable that the data available can be used to support the strong claim that attention *cannot* be directed to purely conceptual states in reflection, or conscious thoughts, which is what is at stake here. [5] This weakens one of the main motivations for CI. And the case of unsymbolized thinking, which we will see next, seems to suggest that attention can be directed to non-sensory states in reflection.

[4] Carruthers and Prinz argue that attention makes items available for working memory, and that working memory is the system where consciousness takes place. See Xu (2017) for a criticism of the idea that sensory regions of the brain play a necessary role for storage of visual information in working memory, and Pearson and Keogh (2019) for the claim that visual working memory doesn't need to involve visual imagery.

[5] Chun et al. (2011) suggest that attention can be internal or external. External attention is the selection and modulation of sensory information from the world, and internal attention is "the selection and modulation of internally generated information, such as the contents of working memory, long-term memory, task sets, or response selection" (Chun et al., 2011, p. 77). Though external attention is perceptual, internal attention (such as when we attend to our thoughts), might not be. Carruthers and Prinz may then be right about external attention being perceptual, but wrong about internal attention. I thank an anonymous reviewer for drawing my attention to the distinction.

3 Unsymbolized Thinking

"Unsymbolized thinking" is what the psychologist Russell Hurlburt calls "the experience of an explicit, differentiated thought that does not include the experience of words, images, or any other symbols" (Hurlburt & Akhter, 2008, p. 1366). Hurlburt developed a method to investigate conscious experience, called Descriptive Experience Sampling (DES). Participants go about their normal lives and are instructed to attend to, take notes about, and later report on the experiences they were having when a random beep goes off.[6] He found that unsymbolized thinking is one of the five most frequent kinds of experiences people report, together with inner speech, inner seeing (i.e. visual imagery), feelings and sensory awareness.

One example is the experience reported by Abigail, who said she was wondering whether her friend Julio would be driving his car or his pickup truck when giving her a ride that afternoon. Another example is that of Evelyn, who was watching a commercial for NetZero, an internet company, and "wondered how much cheaper that is than Cox Cable". These thoughts were reportedly experienced with no words or images (Hurlburt & Akhter, 2008).[7]

Unsymbolized thoughts pose a problem for the proponents of CI. If there are conscious thoughts that do not involve images, as Hurlburt's investigations suggest, CI is false.

Now, Carruthers recognizes that unsymbolized thinking is a problem for his view, but he emphasizes that "only *some* people report entertaining amodal thoughts" (2015, p. 117), adding that it would be puzzling if there were an amodal conscious workspace, where amodal propositional attitudes can be consciously entertained, present in all humans but that goes unused in most people. One problem here is that even if just one person experienced unsymbolized thinking, that would be enough to refute CI, for that would show that it is possible for conscious thoughts to occur in the absence of images. A second problem is that unsymbolized thoughts are in fact quite common. In Heavey and Hurlburt's study (2008), they comprised 22% of all the experiences sampled, and 22 out of 30 participants reported experiencing unsymbolized thoughts in at least one sample. For comparison, the overall frequency of inner speech was 26%, and 25 out of 30 participants experienced inner speech in at least one sample. Although there were significant individual differences, half of the participants "experienced unsymbolized thinking in at least a quarter of their samples" (p. 806). Given that unsymbolized thinking appears to be quite frequent, if it does require an amodal workspace to occur, it is not one that goes unused for most people.

CI predicts then that unsymbolized thinking, an apparently frequent phenomenon, is impossible. How could CI proponents respond? They have at least two possible responses here. They could (1) claim that images were involved in those thoughts, despite what subjects reported. Or they could (2) claim that subjects just self-attrib-

[6] For discussion on advantages and disadvantages of DES as a method to study conscious experience, see Hurlburt and Schwitzgebel (2007).

[7] The name "unsymbolized thinking" is somewhat misleading, for even if these thoughts do not include images or words, they appear to include concepts, which certainly count as symbols, as they represent something. But what matters here is that they do not involve images (including auditory images of words).

uted unsymbolized thoughts, but those thoughts either didn't actually occur (they were confabulating) or, if they did, they occurred unconsciously. Both responses involve an attribution of error to the subjects. Let's consider these options in turn.

3.1 The Mistake Reply 1: Images were Present

A natural response for the proponent of CI against unsymbolized thinking is to say that subjects are mistaken because images were in fact present. Both Prinz and Carruthers show sympathy for this move. Although Prinz doesn't discuss Hurlburt's investigations, he considers the imageless thought debate, which occupied introspectionist psychologists at the beginning of the 20th century. According to him, subjects who report imageless thoughts "are simply wrong about their own mental states" (2012, p. 157).

Carruthers discusses unsymbolized thoughts explicitly, and claims that Hurlburt's data can be alternatively explained by postulating that "there *were* sufficient sensory cues available, either at or shortly before the moment of the beep. But these were forgotten when participants complied with the requirements of the introspection-sampling protocol and recorded only what was at the *focus* of their attention at the moment of the beep" (2015, p. 117). The suggestion is that the experience reported had both imagistic and conceptual or amodal components. The subjects were focusing their attention on the amodal components, so they simply forgot that images were also present.

One problem with this response is that it is ad hoc (Machery, 2005, p. 473). As we've seen, some proponents of CI rely on introspection to support it. But if introspection can be trusted when it supports the view that consciousness is imagistic, it should be equally trusted when it supports the opposite view. Some reason would have to be given for why the reports of imagistic thoughts are to be considered more reliable than the reports of non-imagistic ones (Vicente & Martínez-Manrique, 2016, p. 174).

Another problem is that, with this alternative interpretation, the proponent of CI is conceding that one can attend to conceptual (or amodal) elements of one's experiences. This, however, is at odds with one of the main motivations for CI, namely, that consciousness requires attention, and that attention is a sensory phenomenon, involving signals that are directed exclusively to perceptual areas of the brain (Prinz, 2012; Carruthers, 2015). If, at the moment of the beep, participants were focusing attention on the amodal elements of the experience, then attention can after all be directed to amodal elements, and hence, presumably, attentional signals can be sent to non-sensory areas of the brain. There is then a tension between the proposal that people focused their attention on amodal aspects of their experiences and the CI proponents' view of attention.

However, despite these issues, there is still something to be said for the possibility that subjects were mistaken in their reports of unsymbolized thoughts. We are not generally used to attending to and reporting the vehicles of our conscious thoughts. When we report our thoughts, we usually report their contents, or *what* we think about, and not *how* we experience those thoughts. Perhaps, then, Hurlburt's subjects reported only what they were thinking about, failing to notice that their thoughts

occurred in images. For instance, the CI proponent could say that Evelyn, who was wondering how much cheaper NetZero is than Cox Cable, in fact heard herself say in inner speech something like "how much cheaper is NetZero than Cox Cable?", but did not attend to it and forgot that the sentence was present, mistakenly reporting her thought to be unsymbolized.

Now, it is true that we are not generally used to attending to the vehicles of our conscious thoughts. But it is important to note that participants were instructed to "pay attention to the experience that was ongoing at the moment of the beep" (Heavey and Hurlburt, p. 299). Hurlburt and colleagues wanted to uncover primarily how thoughts were experienced, and not what subjects were thinking about. Subjects went through several interviews, which gave them a chance to improve their ability to attend to and describe their experiences. Reporting one's experiences in DES is more rigorous than reporting thoughts in ordinary life, where people do frequently report what they are thinking about, disregarding how the thought manifests itself. Subjects should then be particularly sensitive to any imagery in their experience when they hear the beep go off.

Also, as Heavey and Hurlburt (2008) note, subjects who reported unsymbolized thinking in some samples usually reported imagistic experiences in others, and with practice they became more confident in distinguishing the two. This speaks against Tye and Wright's (2011) suggestion that the noise of the beeper, together with the task of recording ones' experiences, could have a masking effect, affecting the subject's ability to access and report on imagery that was present when the allegedly unsymbolized thought occurred. If that were the case, then subjects should tend to over-report unsymbolized thinking. Participants had no trouble, however, reporting visual imagery or inner speech, and distinguishing them from unsymbolized thinking. Besides, some subjects report multiple experiences at the same time, and Hurlburt and Heavey (2018) mention the case of a subject who reported experiencing inner speech and unsymbolized thinking in the same sample. If the masking account were correct, we would have to say that the demands of the task masked the imagery that was present in the unsymbolized thought, but not the imagery that was present in the inner speech experience, which seems quite ad hoc. This raises doubts about the masking effect account.

One might here say, in support of CI, that positive reports are more reliable than negative reports; we can trust when someone reports the presence of images or words, but when it comes to reports of thoughts which lack imagery (i.e. unsymbolized thoughts) it can always be that the subject is missing something.[8] Now, reports of unsymbolized thoughts are fallible. But so are positive reports. In fact, Hurlburt and collaborators argue that reports of unsymbolized thoughts are *more* reliable than reports of inner speech. According to them, many of their subjects tend to over-report inner speech in initial samples, and some struggle at first to report unsymbolized thinking, presumably because they hold a common presupposition that thinking occurs in words (Hurlburt & Akhter, 2008; Heavey & Hurlburt, 2008). In addition, perhaps because inner speech is so common for most of us, it could be that we overestimate its presence. Also, given that few of us focus on how our thoughts occur to us

[8] I thank an anonymous reviewer for making this point.

in ordinary life, we might initially confuse the means of reporting our thoughts with their conscious vehicles, that is, it is possible that the process of verbalizing thoughts might lead one to believe that the thought itself was verbalized (Machery, 2005). It is easy to imagine, then, how one may be wrong when reporting inner speech. Reporting unsymbolized thinking, however, involves going against a common presupposition. One could then reasonably expect, as Hurlburt points out, that mistakes would be more likely in reports of inner speech than in reports of unsymbolized thoughts.

3.2 The Mistake Reply 2: Self-Interpretation and Unconscious Thoughts

A second option for the proponent of CI would be to say that people just self-attributed thoughts that didn't consciously occur to them, but that made sense of their behavior. If the thoughts actually occurred and were unsymbolized, they must have been unconscious. They were not directly available to the subjects at the moment of their occurrence, but were self-attributed as a result of an interpretation (Carruthers, 1996, pp. 241-2), for only imagistic states can be conscious. This too involves the attribution of error to subjects, as it amounts to saying that they were mistaken in believing that they consciously experienced unsymbolized thinking, but it concedes that unsymbolized thoughts could have occurred unconsciously.

In Carruthers' view, people typically self-attribute thoughts on the basis of contextual, behavioral and imagery cues. But in the case of unsymbolized thinking, imagery appears to be unavailable. He claims, however, that many cases of unsymbolized thoughts are such that they could have been attributed by an observer on the basis of behavior and circumstances, no imagery being necessary (Carruthers, 2011, p. 215; see also Tye & Wright, 2011). Consider the case of Diane, who at the moment of the beep was wondering whether or not to buy a box of cereal, while standing in front of the cereal shelves (Hurlburt, 1993). Carruthers says that one could have attributed that thought to her based on observing her behavior. It is then possible that this is what she herself did. When prompted by the beep, she observed her behavior, and inferred that she was wondering whether to buy a box of cereal. She wasn't really conscious of an unsymbolized thought, but it made sense of her behavior. If that thought occurred at all, given that it lacked images, it had to be unconscious.

However, contra Carruthers, many of the unsymbolized thoughts reported are not such that they could have been attributed by an observer, in all their specificity (see the cases in Hurlburt, 1993 and Hurlburt & Akhter, 2008). The very case Carruthers considers is problematic, since the thought Diane reported was in fact a lot more complex. As Hurlburt (1993) reports,

> She was standing in front of the shelves of breakfast cereal wondering if she should buy a box. This wondering involved a recognition that she didn't usually eat breakfast (or had only a glass of juice), a consideration of whether she would in fact eat the cereal or whether it would be wasted, and a consideration of the expense involved. (…) At the same time, she was Unsymbolized Thinking that she didn't like buying her own groceries because it was too hard to make decisions. (p. 94).

Now, perhaps Diane could have inferred all that from her behavior, circumstances *and* appropriate background knowledge of preferences and habits. But still, if all she needed was to make sense of her behavior, she would not have to self-attribute such a complicated thought. She could just have said that she was wondering whether or not to buy a box. In fact, in many reports of unsymbolized thinking, it is unlikely that the person should have to self-attribute a thought at all, to make sense of her behavior. Consider again the case of Evelyn, who was watching a commercial for NetZero and wondering how much cheaper that was than Cox Cable. When the beeper went off, she could have said that she was just experiencing the commercial. There was no obvious need for her to self-attribute that thought, in order to explain her behavior, let alone a thought that was unsymbolized. It is thus simpler to assume that subjects report unsymbolized thoughts because that is what they were experiencing, and not because they were trying to make sense of their behavior.

Carruthers grants, though, that some cases of unsymbolized thinking are harder to explain, for there is nothing in the immediate circumstances or behavior, and no imagery at the moment of the beep, that could serve as the evidential basis for the self-interpretation and attribution of the specific unsymbolized thoughts reported. In those cases, he postulates that there must have been images just before the experience reported. He considers the example of Abigail mentioned above, who was unsymbolized wondering whether her friend Julio would be driving his car or his pickup truck when giving her a ride. Carruthers speculates that shortly before the beep she might have experienced a sentence in inner speech such as "Will Julio be driving his car or his truck?". Her mindreading system took that sentence as input and it output "a higher-order belief that she is wondering whether Julio will be driving his car or his truck. This belief might remain at the time of the beep" (2011, p. 216). What she reported was not actually an unsymbolized thought, but this higher-order belief which was "formed by the mindreading system from interpretation of imagistic activity that had been occurring just previously" (2011, p. 216).

Now, since participants were asked to report their experiences only at the moment of the beep, there is no way of knowing whether they experienced imagery some time before. But even if they did, it isn't clear how that helps CI. For we can still ask about Abigail's higher-order belief whether it was imagistic or not. To assume it was would be to postulate imagery ad hoc, for Abigail reports no imagery at the moment of the beep. And Carruthers himself is here conceding that the higher-order belief remains while the imagery that was postulated to be present before is gone. To accept, on the other hand, that the higher-order belief is not imagistic would be to go against CI, and to concede that conscious thoughts (namely higher-order beliefs) can be non-imagistic.

In response, Carruthers could say that the higher-order beliefs subjects report, because unsymbolized, are not conscious. But they surely have some of the marks of access conscious thoughts. Not only are they available for verbal report – as subjects report them – but they also appear to be, at least in some of the cases, used in reasoning, decision-making and memory formation. In Diane's case, for instance, her unsymbolized thoughts seem to be part of her decision-making process of whether she should buy the cereal. She also remembered the thoughts she had and reported

them in a subsequent interview. This suggests that the thoughts subjects report are access conscious.

For what is at stake, namely whether access conscious thoughts can be non-imagistic, it is in fact irrelevant whether the thought being reported results from an interpretation. For even if what subjects report are higher-order beliefs resulting from an interpretation, those beliefs are unsymbolized and access conscious.

The point here is not that people cannot be wrong about their experiences. They frequently are. And the DES method is not perfect. Among other things, the interviews generally happen the following day and people rely partly on memory in their descriptions (as well as on notes they've taken). But the method was designed to minimize confabulation, by focusing on descriptions of particular experiences, randomly selected, instead of relying on what people believe about their experiences in general. There seems to be no reason to doubt people's general descriptions of their current experiences (e.g. that they are experiencing inner speech and not visual imagery), even if they might sometimes be wrong about their details (Hurlburt & Schwitzgebel, 2007).

In fact, both Prinz and Carruthers actually rely on Hurlburt's data when it comes to emphasizing the importance of inner speech or visual imagery (Prinz, 2012, p. 159; Carruthers 2015, p. 81 and p. 95). The sole reason they postulate a mistake in the reports of unsymbolized thoughts is to safeguard CI, for they postulate no mistakes when people report imagistic experiences. And no good reason has been given as to why people's ability to introspect on their experiences should be especially unreliable in the case of unsymbolized thinking.

We've seen that both strategies to dismiss unsymbolized thinking as a genuine case of conscious thoughts without images, namely to say that imagery was present and to say that unsymbolized thoughts are self-attributed as a result of an interpretation and so unconscious, are unpromising.

4 Aphantasia

Another challenge to CI comes from aphantasia, a condition that has been known since at least the 19th Century (Galton, 1880), but that has only recently attracted the attention of psychologists and that was only named in 2015 (Zeman et al., 2015). Aphantasia is commonly characterized as an impaired capacity to create visual mental images (Keogh & Pearson, 2018; Dawes et al., 2020). According to one estimate, approximately 3.9% of the population have absent or weak visual imagery, and complete absence of visual imagery affects 0.8% of the population (Dance et al., 2022). Important to our case, though, impairment of imagery is not always restricted to the visual domain. In a recent study, 34% of aphantasics reported a total lack of imagery in all sense modalities (Dance et al., 2021), suggesting that aphantasia can be multisensory (Monzel et al., 2022). Given that total aphantasia, as I'll call it,[9] also affects

[9] I follow Monzel et al. (2022) in using "aphantasia" to designate impaired imagery across sensory modalities, adding the qualifier "total" to highlight that. In addition, I'm focusing on the extreme cases of total aphantasia, i.e. of complete *absence* of imagery, excluding cases of weak imagery.

auditory images, it possibly has an impact on inner speech. As Faw describes his own aphantasia, "when I close my eyes I see nothing, I silently think and silently read (with no auditory 'voice'), and am haunted by silent tunes (with no auditory sound)" (2009, p. 2). If we take auditory imagery to be constitutive of inner speech, as many do (e.g. Langland-Hassan 2018), then total aphantasics lack inner speech as well.

To assess whether an individual is aphantasic, researchers typically administer the Vividness of Visual Imagery Questionnaire (VVIQ) (Zeman et al., 2015; Dawes et al., 2020, Milton et al., 2021), which instructs participants to imagine various things (such as a friend, or a rising sun) and rate the vividness of the image from 1 ("No image at all, you only 'know' that you are thinking of the object") to 5 ("Perfectly clear and vivid as real seeing"). Aphantasics report much lower ratings of vividness of imagery when compared to controls (Zeman et al., 2015; Keogh & Pearson, 2018).

As with unsymbolized thinking, aphantasia presents a problem for CI, perhaps an even more challenging one, for the conscious thoughts of total aphantasics are *never* imagistic. CI proponents could again claim (1) that total aphantasics are mistaken in their reports, because their conscious thoughts involve imagery. Or (2) that aphantasics have imageless thoughts, but these thoughts are not access conscious.

(2) is more implausible here than it is in the case of unsymbolized thinking. In that case, the proponent of CI would only have to deny the conscious status of some thoughts (namely, those reported to be unsymbolized). In the case of total aphantasics, however, this would amount to saying that they have no access conscious thoughts at all, for none of their thoughts are imagistic. They should be incapable, for instance, of conscious reflection, remembering, reasoning, planning and decision-making. But nothing indicates that they are. Aphantasics, for instance, score slightly higher on IQ tests than hyperphantasics (individuals with extremely vivid imagery) (Milton et al., 2021). Given that IQ tests typically require reflection and deliberation, and hence access conscious thoughts, aphantasics' good performance suggests that they are not lacking in these domains. They can also perform as accurately as controls in some working memory tasks (Keogh et al., 2021; Pounder et al., 2021). Also, aphantasics report otherwise typical lives, so much so that aphantasia was only named very recently, and many aphantasics only notice their condition later in life (Zeman et al., 2020). It seems unlikely, then, that their difference lies in something so dramatic as them lacking access conscious thoughts.

The best response to cases of aphantasia is (1) above, i.e. that aphantasics are mistaken: they do have imagery, despite what they say. They are just not the best judges of what goes on in their minds.

Now, people can be wrong about several aspects of their mental states, e.g. about the causes of their choices and behaviors (Nisbett & Wilson, 1977), or about how frequent a certain kind of experience is (Hurlburt & Akhter, 2008). They can also be mistaken about features of their current experiences, believing, for instance, that visual experiences are clear and detailed at the periphery when they are not (Schwitzgebel, 2008).

The CI proponent could then say that aphantasia is just another case in which people are wrong about their mental lives. Their low ratings of vividness of imagery reflect their poor ability to introspect on their experiences, and so questionnaires such as the VVIQ cannot be trusted. One important thing to notice, however, is that the

kind of introspective mistake that would have to be involved in total aphantasia is much more substantial than the ones aforementioned (and others that Schwitzgebel (2008) considers). Aphantasics must be completely wrong about some of their current experiences, not just about some details: they actually experience the image of a rising sun when responding to the VVIQ, for instance, despite denying so. And it is certainly hard to know what to make of the suggestion that one can have conscious images that one is utterly unable to access (Phillips, 2014, p. 282). Aphantasics must be also massively mistaken in their general beliefs about their experiences: they are getting it wrong about how all of their conscious thoughts are like all of the time, not just about some thoughts and not just occasionally. They mistakenly believe that they lack whole classes of experiences that they in fact have, as they can visualize or hear their own voice speaking internally, like any other person.

Could one be wrong about the very existence of a certain kind of experience? There seems to be at least one precedent, which is that of unsymbolized thinking. As Hurlburt notes, many DES subjects are surprised to find themselves aware of unsymbolized thoughts. An entire class of experiences can then go unnoticed for some people. Maybe the same happens with aphantasics?

Now, the mistake in the case of unsymbolized thinking can be explained at least in part by the common belief that thoughts occur in language, which may bias people's judgment about their experience. But there is no equivalent presupposition that would explain the mistake in aphantasia. In fact, it is part of folk belief that people can picture things that aren't present, and that they can hear themselves talk without saying things out loud. These beliefs manifest themselves in common sayings and expressions such as "picture this", "the mind's eye", or "the little voice in my head." Unlike the case of unsymbolized thoughts, aphantasics don't have any reason to doubt that they have imagery. And they frequently show surprise when they learn that others can actually visualize or hear things in their heads, and that phrases like "picture this" are not just figures of speech (Faw, 2009).

Schwitzgebel (2002), however, gives a reason for the view that people can be mistaken about their visual imagery experiences. He claims that there isn't a strong correlation between self-reported visual imagery vividness and performance on psychological tests believed to require visual imagery. Self-reported poor and strong visualizers will show similar performance on imagery tasks, such as those involving mental rotation. This indicates, in his view, that people's visual imagery experiences don't vary as much as self-report suggests, for if they did, these differences would show up in objective measures of visual imagery. Schwitzgebel concludes that "normal people, in favorable circumstances, make gross and enduring errors about the nature of their visual imagery experience" (2002, p. 36). Schwitzgebel doesn't say who is right: those who report lack of imagery, average, or strong visual imagery. But if imagery tasks really require imagery, then those who report lacking them while being able to perform those tasks are not the ones getting it right.

However, contra Schwitzgebel, it is possible, as some have pointed out, that some tasks that are commonly believed to require visual images don't actually require them, and that, to the extent that aphantasics can solve them, it is because they use alternative strategies (Zeman et al., 2010; Pearson, 2019). Let's consider the case of patient MX, reported by Zeman et al. (2010). MX reported the sudden loss of the ability to

form visual images following a heart procedure. Despite that, he was still capable of performing well in so-called visual imagery tasks. He could recall visual details such as the relative length of different animals' tails, answer questions such as 'Is the green of grass darker than the green of a pine tree?' and he did well in a famous face feature test (which asked questions about details of famous faces).[10] He also performed well in a mental rotation task. However, some differences were found between MX and controls. He was slower than controls in the Shepard-Metzler mental rotation task and, according to the authors, exhibited a different pattern of responses (Zeman et al., 2010, pp. 151-2).[11] The researchers also scanned his brain when perceiving and when imagining faces of famous people. The perception of faces activated the same brain areas in MX and the control group. However, when asked to imagine famous faces, posterior brain regions belonging to the face perception 'core' network were less active in MX than in controls. In addition, MX showed stronger activation in frontal areas of the brain, when compared to controls.

Now, MX was otherwise completely normal, and nothing seemed to suggest that he could be mistaken about his loss of imagery. In fact, the report of someone who claims to have lost visual imagery should be less subject to doubt than of someone who claims to always have lacked it. It couldn't, for instance, be dismissed as a difference in how he classifies or describes his experiences, for example, as he will have noticed a substantive difference in what some of his conscious experiences were like before and after his heart procedure. Besides, the fMRI data and his reaction times in one mental rotation task seem to support his report. So a natural way to interpret his similar performance on some of the imagery tasks when compared to controls is that MX was using different strategies to solve them (Zeman et al., 2010) – and not, as Schwitzgebel might say, that he didn't really lack imagery. In the case of the mental rotation task, MX himself reports that "he was attempting to match individual blocks and angles perceptually when making his decision" (Zeman et al., 2010, p. 152). We should be cautious then in inferring the similarity in visual imagery experiences from similarity in performance in "imagery" tasks. Some tasks might not be well suited to assess visual imagery, despite what psychologists believe.

In addition, recent studies have found further differences between visual aphantasics and controls, which go beyond self-report, and which speak against Schwitzgebel's suggestion that there is no correlation between self-report imagery abilities and performance on imagery tasks. For instance, Keogh and Pearson (2018, 2021) found that aphantasics perform differently from controls in an imagery task that exploits binocular rivalry. Binocular rivalry occurs when different images are presented to the right and left eye. Instead of overlapping, one image dominates while the other is suppressed (i.e. there is rivalry between the two) and, for prolonged viewings, they alternate. Research has shown that imagery primes rivalry dominance, such that when a subject is asked to imagine, say, a red horizontal Gabor patch, and is subsequently briefly presented with a red horizontal Gabor patch to one eye and a green

[10] More recent studies show that congenital aphantasics are also as accurate as controls in these kinds of tasks (cf. Milton et al., 2021).

[11] In Pounder et al. (2021), congenital extreme aphantasics were slower than controls in a mental rotation task, but they found no significant interaction between the angle of rotation and group.

vertical Gabor patch to the other, the red one is more likely to dominate perception (Pearson et al., 2008). Aphantasics, however, showed no perceptual priming in binocular rivalry after being prompted to imagine a colored Gabor patch. This is taken to suggest that they truly can't form mental images, because if they could, the image should prime perception as much as it does in controls, which did not occur.

In another experiment (Monzel et al., 2021), a visual search task, participants were first presented with a written word (e.g. "banana") followed by a 4s period when they were supposed to visualize the corresponding object. They were then presented either with two words (e.g. "banana" and "tomato"), or with two images (e.g. of a banana and of a tomato), side by side, and they had to indicate which matched the target object. Aphantasics were as accurate as controls, but they had slower reaction times than imagers when they had to choose between the image pairs (but not when the alternatives were two words). This is interpreted as showing that mental images influence perception in imagers but not in aphantasics.

One could object that in these studies, alleged aphantasics refused to imagine when instructed to do so, though they could have done so. This would explain their differences in performance when compared to controls. But note that differences have been found between aphantasics and imagers even in tasks that did not explicitly instruct participants to form mental images. For example, one study compared the physiological responses associated with fear in aphantasics and imagers when participants saw fearful images and when they read fear-inducing fictitious scenarios (Wicken et al., 2021). Aphantasics showed similar physiological responses as imagers when perceiving fearful images, but they showed significantly reduced fear physiological responses compared to imagers when reading fearful stories. The natural conclusion is that mental images were spontaneously formed when reading a story, and they played a role in amplifying emotions, but only in imagers. Now given that there were no instructions for participants to form mental images, we have no reason to think that aphantasics were trying not to form images in this case – all they had to do was to read the story. And yet, if their ability to form images were intact, we should have expected similar responses between aphantasics and controls. But given that aphantasics didn't show the typical emotional responses in a task that typically induces mental images, it is natural to assume that this is because they truly lack imagery.[12]

There aren't yet many brain imaging studies with aphantasics, but some studies have found differences in brain activation when comparing aphantasics and controls in tasks involving imagery (as in the case of MX, reported in Zeman et al., 2010; see also Milton et al., 2021), in resting state (Milton et al., 2021) and in tasks involving episodic memory recall (Palombo et al., 2015).

All these differences corroborate the self-report data from questionnaires, and indicate that aphantasics truly lack visual imagery.[13] They also suggest, contrary to Schwitzgebel, that not all imagery tasks actually assess imagery. In the "imagery"

[12] See also Keogh and Pearson's (2021) attentional template study for another study that did not involve explicit instructions for participants to imagine. And see Kay et al. (2022) for another nice study that corroborates aphantasics' reports. They address and reject the possibility that aphantasics were trying not to form an image in their study (which, in this case, involved instructions to form images).

[13] See also Bainbridge et al. (2021) for further results supporting aphantasics' self-reports.

tasks where aphantasics show no difference in performance from controls (which include, for instance, some mental rotation and working memory tasks), it is reasonable to assume that aphantasics employ different strategies (Zeman et al., 2010; Pearson & Keogh, 2019).[14]

Another possibility that has been suggested is that aphantasics have unconscious visual mental images, and that that would explain why they perform similarly to controls in some tasks (Nanay, 2021; Phillips, 2014; Faw, 2009).[15] One issue here is that some explanation would have to be given for why their alleged unconscious mental imagery issues similarity of performance to controls in some tasks but not others. But even if they have unconscious imagery, that wouldn't do any favor to the proponents of CI, as it is conscious mental images that they claim are necessary for conscious thoughts. And proponents of the view that aphantasics have unconscious imagery agree that aphantasics lack those.

To recapitulate, we've seen that total aphantasia creates a problem for CI, for total aphantasics report having no mental imagery, but nothing indicates that they lack access conscious thoughts. The CI proponent could claim that aphantasics are mistaken and have imagery, but that would involve the attribution of a massive mistake to them, which appears unjustified, especially given the growing body of evidence that shows behavioral and neural differences between aphantasics and controls. These differences, in addition to the differences in self-report, are better explained if aphantasics truly lack visual imagery.

4.1 Aphantasia and Inner Speech

We've seen that aphantasics report an inability to produce visual imagery, and I have reviewed some of the studies that support their reports. But as I pointed out, aphantasics tend to report, by means of questionnaires, lack of auditory imagery as well, claiming to be unable, for instance, to imagine the sound of rain, or the voice of a teacher reading a story (Hinwar & Lambert, 2021). If auditory imagery is constitutive of inner speech, and if aphantasics lack that, then they lack inner speech as well. They do not experience a "voice in the head", as inner speech is often described.

Objective measures assessing aphantasia have so far focused on visual imagery. More research assessing auditory imagery and inner speech in aphantasia is needed. But a few things can still be said. First, if we accept the data on unsymbolized thinking, then propositional thoughts can be conscious and yet lack any kind of imagery. And Heavey and Hurlburt (2008) found individual differences in the frequency of unsymbolized thinking and inner speech, such that some subjects never reported inner speech and one subject (out of 30) reported experiencing unsymbolized thinking 80% of the time.

[14] Which alternative strategy aphantasics use might depend on the task being considered. For mental rotation, for example, Pounder et al. (2021) suggest that aphantasics might use spatial imagery or unconscious visual imagery. For other tasks, it could be that they recruit conceptual knowledge, or name the stimuli to remember them. But more investigation is needed here.

[15] Though see Keogh et al. (2021) for criticism.

In addition, independent work with patients with aphasia (a language deficit usually due to a stroke) suggests that, on some tasks at least, inner speech can be compromised while overt speech is preserved. Geva et al. (2011) found that some patients with aphasia show a deficit in a silent rhyme task, which involved judging whether two written words rhymed without saying them out loud. This is believed to require subjects to internally generate an auditory image of the sounds of words. They were still capable, however, of repeating sentences out loud. Langland-Hassan et al. (2015) employed a variant of the rhyme task, in which patients with aphasia had to silently judge whether the words naming the objects in two pictures rhymed. Some patients were severely impaired in that task, while still being capable of overtly naming objects, and of judging whether two words that were spoken to them rhymed. This suggests that one can have some outer speech preserved without inner speech, just as one can have visual perception without having visual imagery.

One possibility, then, is that total aphantasics simply lack inner speech – though, unlike individuals with aphasia, they show no language deficits. It could be that their conscious propositional thoughts are all unsymbolized, in the sense that they do not involve any kind of imagery or words.

But there is a second possibility. Some total aphantasics say that they sometimes think in words, but without experiencing anything like "hearing" those words, i.e., without auditory imagery. In describing his aphantasia, Watkins reports that he is sometimes aware of "'unheard' words that carry thoughts" (Watkins, 2018, p. 44). If we take his report at face value,[16] then the conscious thoughts of at least some total aphantasics are not all unsymbolized, in Hurlburt's sense, for some of them include words. Given that these thoughts include words, it is reasonable to count them as inner speech. And given that they lack imagery, it is reasonable to object to the view that inner speech necessarily involves auditory imagery. In fact, some have argued that auditory imagery is not necessary for inner speech. Vicente and Martínez-Manrique (2016), for instance, argue that inner speech typically involves many stages of production and recruits semantic, syntactic and phonological representations, but some instances of inner speech might be aborted before they reach phonological representations.[17] Perhaps then some aphantasics have inner speech that fails to generate auditory images.

The CI proponent could accept that aphantasics lack auditory imagery in inner speech, but claim that their thinking in "unheard words" involves imagery of some other kind. One possibility would be visual images of words. But given that we have good reason to believe aphantasics lack visual imagery, we can rule that possibility

[16] Similar reports are common in online groups of aphantasia. See Gauker (2018, p. 58) for another report of the experience of words without a voice associated with them. And Roebuck and Lupyan (2020), who report that 19% of respondents of their Internal Representations Questionnaire disagreed with the statement "I hear words in my 'mind's ear' when I think".

[17] But they, unlike me, identify inner speech that lacks auditory imagery with unsymbolized thinking. This, however, doesn't allow for the distinction between a thought that involves "unheard" words and a thought that does not involve words at all. Both lack auditory imagery, but only the latter corresponds to unsymbolized thinking. Unlike unsymbolized thinking, the experience of unheard words might be one that involves representations of phonological information, but which fail to generate quasi-perceptual experiences.

out. Another suggestion would be that aphantasics experience motor, or articulatory images, associated with the movements of the mouth and larynx that are involved in speech production. Some argue that inner speech involves motor simulation of those movements (which are not executed), which then generates an estimation of their perceptual consequences, that is, auditory images of the sounds that would be heard if the movements were executed (Tian & Poeppel, 2012). Perhaps aphantasics have motor images that somehow fail to generate the corresponding auditory images.

Now, the extent to which inner speech actually involves motor representations is itself a matter of debate, some arguing that it involves specific articulatory representations, others that it is typically condensed, involving abstract linguistic representations that don't specify articulatory details (cf. Oppenheim & Dell, 2010). But even if motor representations are involved in inner speech, it is not obvious that they are made conscious. According to Prinz and Carruthers' own account, motor representations would have to be attended to in order to be conscious. And it is not clear that inner speech involves attention to images of movements. If motor representations are not made conscious, then their presence should not help support CI. Besides, even if motor representations are experienced in inner speech in imagers, the same might not be true for aphantasics, as aphantasics also report impaired motor imagery (Dance et al., 2021).

A better option here for the CI proponent might be to insist that auditory imagery must be involved in the experience of unheard words. They could claim, along with Langland-Hassan (2018), that to the extent that aphantasics are able to identify the words that occur to them and the language they belong to, that must be on the basis of auditory imagery (and not on motor imagery). There is, however, some independent evidence for real individual differences in auditory imagery abilities. Lima et al. (2015) found that differences in self-reported vividness of auditory imagery correspond to structural differences in the brain. And Berger and Ehrsson (2018) found that imagining a sound typical of collisions can make two passing discs to be perceived as bouncing off each other when they meet. Importantly, self-reported vividness of auditory imagery served to predict the extent to which subjects experienced the illusion. These behavioral and brain differences corroborate self-reports of vividness of auditory imagery, and give credibility to aphantasics' report (even if aphantasics were not the focus of these studies). We should be cautious then and not simply postulate that auditory images must be present in the experience of unheard words.

It is possible that, when thinking in unheard words, aphantasics simply become aware of linguistic representations (perhaps even complete linguistic representations, encoding semantic, syntactic and phonological information), without them generating any corresponding sensory image. The production of inner speech in aphantasics could be aborted after phonological information is specified, but before it generates auditory imagery. This might correspond to aphantasics having the sense that they are thinking in words, without the experience of what it would be like to say or hear those words.

We do not have enough data to settle the issues of whether some total aphantasics lack inner speech, and of whether some can think in words without auditory and motor images. More would need to be known about the character of their experiences, and of the mechanisms behind them. But as Geva (2018) points out, there are

important similarities between inner speech and mental imagery, and there appears to be variability in inner speech experiences and in auditory imagery. We have then good reason to suspect that aphantasics' lack of mental imagery will affect their inner speech experience, if they have it, and to be skeptical of the postulation that aphantasics must have inner speech with corresponding imagery. This again challenges CI.

5 Phenomenal Consciousness

I have so far argued that aphantasia and unsymbolized thinking challenge the view that access conscious thoughts are necessarily imagistic. Let me end with a note on phenomenal consciousness. There is a natural connection between the present discussion and the debate about whether there is such a thing as cognitive phenomenology – a phenomenology of thoughts which goes beyond the phenomenology of imagery in which they might be embedded (Bayne & Montague, 2011). In the case of unsymbolized thinking, individuals report thoughts which they are aware of, without experiencing any words or images. Hurlburt and Akhter in fact describe unsymbolized thinking as "a way of *experiencing*, an aspect of a person's phenomenology. It is directly observable, appears directly before the footlights of consciousness, is directly apprehended" (2008, p. 1366). Given that individuals typically distinguish between unsymbolized thinking and other kinds of experiences, such as visual imagery, inner speech and sensory awareness, a natural suggestion is that they do so at least partly on the basis of the phenomenal character of these experiences. In addition, as Vicente and Martínez-Manrique (2016) argue, subjects who are surprised to report unsymbolized thoughts are surprised because they become aware of a new kind of experience. If that is correct, then there is something distinctive about the phenomenology of unsymbolized thoughts, which differs from what it is like to experience inner speech or visual imagery, for instance. That suggests that there is such a thing as cognitive phenomenology, and that phenomenally conscious thoughts do not necessarily involve imagery.

Total aphantasia suggests this even more strongly. Unless we are willing to claim that, leaving aside perceptual experiences, emotions and bodily sensations, there is nothing it is like to be an aphantasic, their conscious thoughts must have a phenomenology. But this does not mean that aphantasics are restricted to a unique form of experience when it comes to conscious thoughts. For as I've suggested, some of their thoughts might include ("unheard") words, while others will not, while both are imageless. Some thoughts of some aphantasics might even include, as Watkins reports, "a sensation of having an image that one feels to be there but one can't see, as opposed to, say, a faint image" (2018, p. 44).[18] These seem to correspond to different experiences. Thus, perhaps not all imageless thoughts are imageless in the same way. If imageless thoughts can be experienced in different ways, this suggests not only that there is cognitive phenomenology, but that there

[18] Little is known about the mechanisms behind aphantasia. Watkins' feeling of having an "invisible" image could, perhaps, be explained by the assumption that aphantasics have unconscious imagery. Perhaps some aphantasics can, in some occasions, initiate the process of generating visual imagery, but the process gets interrupted before images reach consciousness. That might leave the subject with a feeling of an image that one can't see, a feeling perhaps akin to the tip-of-the-tongue experience, in which one tries to retrieve a word that one feels to be almost accessible, but which is not experienced.

are multiple forms of it, and so cognitive phenomenology is not a unitary phenomenon. In any case, against CI, thoughts can be phenomenally conscious without imagery.

6 Conclusion

As we've seen, CI predicts that unsymbolized thinking, an apparently frequent phenomenon, as well as total aphantasia are impossible, for it says that one cannot have conscious thoughts without images. Unsymbolized thinking shows that conscious thoughts do not necessarily involve images, even if they sometimes do. And total aphantasia suggests, against CI, that in some individuals, *all* of their conscious thoughts are non-imagistic. I have argued that there are no good reasons to doubt the reports of unsymbolized thinking and aphantasia. The unsymbolized thoughts reported appear to be access conscious, in that they are available not only for verbal report but also e.g. for reasoning and memory formation. Likewise in the case of total aphantasics, as nothing indicates that they lack e.g. conscious reasoning. Recent investigations present data that corroborates visual aphantasics reports, and there is reason to believe that aphantasics' inner speech, if they have it, might lack imagery. In addition, we've seen that aphantasia and unsymbolized thinking also challenge CI as a view about phenomenal consciousness. Taken together, unsymbolized thinking and aphantasia provide a strong challenge to the view that conscious thoughts necessarily involve images. More positively, they suggest that conscious thoughts can be non-imagistic.

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