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Having the Foggiest Idea: A Gradual Account on Mental Images

Kristina Šekrst*

Abstract

First described by Galton in 1880 and then remaining unnoticed for a century, recent investigations in neuroscience have shown that a condition called *aphantasia* appears in certain individuals, which causes them to be unable to experience visual mental imagery. Comparing aphantasia to *hyperphantasia* – i.e., photo-like memory – and considering the neurological basis of perceptual phenomena, we are revisiting Hume's division of perceptions into impressions and ideas. By showing different vivacities of mental phenomena and comparing them to neurological research, we are stating that not only impressions and ideas differ "in the degrees of force and liveliness", but ideas and impressions amongst themselves as well. Such a gradual range of perceptions and mental images bears significant consequences for not only representational theory and historical interpretations but linguistics and semiotics as well.

Key Words: aphantasia, mental images, hyperphantasia, impressions, signified

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An Impression is Worth a Thousand Ideas

The nature of mental images – as experiences closely resembling visual perception of an object – has long been a subject of both research and controversy. Visual mental imagery or the mind's eye refer to 1) quasi-perceptual conscious experience *per se* 2) hypothetical picture-like representations in the mind and/or brain that give rise to (1) 3) hypothetical inner representations of any sort that directly give rise to (1) (Thomas, 2019). The pictorial theory (Kosslyn *et al.*, 2006) states that mental images depict information and that such depicted representations play a functional role in our cognitive abilities. On the other hand, mental imagery may be viewed as quasi-visual phenomenon (Kosslyn, 1980), but quasi-pictorial theory faces experimental challenges, such as Chambers and Reisberg's ambiguous figures experiment (Chambers and Reisberg, 1985). One of

Corresponding author: Kristina Šekrst
Address: University of Zagreb, Faculty of Humanities and Social Sciences, Ivana Lučića 3, Zagreb
e-mail ✉ ksekrst@ffzg.hr
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the main issues lies in the ontological decision of mental imagery being characterized either as a form of experience or a form of representation. The goal of this paper is not to take a stance towards either of these ontological commitments, but to state that each choice is again a matter of a degree, using recent neurological research as the base for such a claim.

Hume's empiricist theory of ideas starts with perceptions, ultimately derived from our experience, that are divided into two distinct kinds: *impressions* and *ideas*. Hume states that such perceptions differ "in the degrees of force and liveliness, with which they strike upon the mind, and make their way into our thought or consciousness" (T1.1.1.1). Impressions enter with most force and violence (our "sensations, passions and emotions"), and ideas are "faint images of these in thinking and reasoning". Such a degree of force and vivacity differentiates impressions and ideas, and exceptions such as dreams, or hallucinations prove the empirical rule since their general status is such that the difference between feeling the pain now and remembering the pain in the past is natural and obvious to the human mind. Hence, Hume affirms that everyone will readily perceive the difference between *feeling* (connected to impressions) and *thinking* (connected to ideas). McGinn (2004) holds that the difference between images and percepts is that images can be willed but percepts cannot. We cannot control our perceptions since those objects exist independently of our existence (of course, taking a non-idealist view). Hallucination or perception differ from mental images because of external factors which we cannot control, producing a phenomenological difference between actively or passively experiencing reality.

Such a difference is often understood as extreme stimulus-driven imagery at one end, and less vivacious ideas, generated by will, independent of the stimulus, at the other end. To illustrate, Thomas (1997) holds that imagerial vocabulary does not have one sharply defined meaning, but a range of meanings, while Savage (1975) remarks that the continuum hypothesis holds that perceptual and imaginative experience differ in degree, being at different points of the experiential spectrum. Savage emphasizes that hallucinations may be similar to perceptions, but a strong degree of vivacity always shows whether the experience is an actual act of perceiving an external object or a sensory error. We must note that such accounts only focus on the distinction between Humean impressions and ideas, leaving the impressions/immediate perceptions as one end and ideas as the other end, presupposing that such classes are uniquely defined with classical truth values so that impressions possess the property of full vivacity and ideas the opposite, a notion that immediately presents itself as vaguely defined.

Blind Mind's Eye

Aphantasia is a neurological condition that can be described as a state of not being able to experience visual mental imagery, i.e., possessing the mind's eye or the ability to see things with the mind. This phenomenon was first described by Francis Galton (1880), and it remained unnoticed and uninvestigated until recent times (Zeman *et al.,* 2010; Zeman *et al.,* 2015).

In a survey published in *Mind* in 1880, Galton had used three criteria – illumination (*Is the image dim or clear?*), definition (*Are the objects well defined and sharp?*), and coloring (*Are the colors distinct and natural?*) to ask his friends and colleagues to describe an imagined object in their mind (i.e., their breakfast table from that day). His test group comprised 100 adult men, of whom 19 had been Fellows of the Royal Society, and he acquired distinct results groups: cases where the faculty is very high, mediocre, or at the lowest. The latter, as a phenomenon of a certain mental deficiency, was characterized by the fact that people having it had not been aware of their condition. Galton found out that "the great majority of the men in science (...) protested that mental imagery was unknown to them", a claim refuted by Brewer and Schommer-Aikins (2006) by reanalyzing his own data, showing that all groups still report substantial imagery. Nevertheless, Galton's research pinpointed the unusual notion that some people could possess a greater faculty of mental imagery and that some people could have it at its lowest state.

Clinical reports provide us with two types of neurogenic visual imagery impairment: either visual memory disorders, causing both visual agnosia and imagery loss, or imagery generation deficits selectively disabling imagery (Zeman *et al.,* 2010). Farah (1984) suggests that it is possible that imagery is not a faculty of the brain, but a collection of epiphenomena, or that imagery is a functional system of the brain, made up of specific subsystems with direct neurological instantiations. Zeman *et al.,* (2015) used the *Vividness of Visual Imagery Questionnaire* to explore the features of aphantasia in participants that became aware of their conditions in their early adolescent years, realizing they do not enjoy the same quasi-visual experience as their peers. Zeman *et al.,* (2015) also suspect that aphantasia will prove to be a variant of neuropsychological functioning akin to synesthesia and congenital prosopagnosia.

Thorudottir *et al.,* (2020) remark that visual imagery and perception cannot share all mechanisms as there are patients with seemingly preserved mental imagery but impaired visual perception. They claim that even though it has been argued that the primary visual cortex (V10) plays a key role in mental imagery, the damage to V1 appears neither necessary nor sufficient for inducing imagery deficits. To illustrate, their patient PL518 was an architect who reported almost complete loss of visual mental imagery following a bilateral stroke in the areas supplied by the posterior cerebral artery,

and even though it is still debated whether imagery and perceptions are associated or dissociated, their results show an overlap of cognitive deficits between patients with similar medical history. The only area of selective lesion in PL518 is a small area in the left fusiform gyrus and a part of the right lingual gyrus that may play an important role in visual imagery (Thorudottir *et al.,* 2020).

A Matter of a Degree

Most philosophical research has focused on the ontological aspect of ideas as representations or perceptions, and on exceptions such as hallucinations, dreams, or sensory errors. From a philosophical aspect, Hume classifies dreams as ideas since they are not sensations ("Thus in sleep, in a fever, in madness, or in any very violent emotions of soul, our ideas may approach to our impressions", T. 1.1.1.1), and what seems to prevent him from classifying them as impressions is the fact that our dreams are not sensations, i.e. sensory-driven experiences that acquaint us with objects from the external world around us (Broughton, 2006). Broughton (2006) emphasizes that a possible explanation is that dreams are ideas because being a sensation and having great liveliness are necessarily connected. From a cognitive perspective on dreams, Zeman *et al.,* (2015, 2016) attest that the majority of their participants had some experience of visual imagery from either dreams or involuntary flashes such as sleep onsets, confirming that aphantasia deals with voluntary invocations of mental imagery. So, mental imagery is somewhat preserved if it is not voluntary. Compared to Hume, impressions as sensations and ideas differ in their force and vivacity, which suggests that an act of sensory perception is more vivacious than a dream or a mental image. However, both dreams and mental images are ideas, and we suggest that ideas themselves differ in force and vivacity as well. If we take aphantasia into account, dreams are still present as involuntary mental imagery phenomena, but voluntary invocations of mental images are not. Therefore, the distinction of impressions and ideas differing in force and vivacity should be extended to both impressions themselves differing in force, and vivacity and ideas as well, along with the notion of volition.

The first gradual range is in the case of perceptions – i.e., Humean impressions – that may differ in a degree of vivacity, cf. blurred visual impression versus unblurred one. Second, they may be both voluntary and involuntary, the latter referring to various phantom perceptions (Pearson and Westbrook, 2015), in which, for example, conscious visual experience[2] does not overtly correspond to

[2]Chang and Pearson state that "the constructive nature of vision is most evident during hallucinations, synesthesia, perceptual filling-in, and many illusions", but we would like to emphasize a philosophically important difference between mental imagery and other perceptual phenomena, more connected to our sensory apparatus rather than our capability of creating completely mental images.

retinal stimulation (Chang and Pearson, 2020). To illustrate, the phenomenon of cortical blindness is characterized by a partial or complete loss of vision, often accompanied by the inability of fixating on and tracking different objects, along with hallucinations and denials of the loss of vision (Aldrich *et al.,* 1987).[3] In the case of cortical blindness, Weiskrantz *et al.,* (1974) have shown that even though patients claim that they cannot see the object they are being tested on, by guessing, they are still guessing correctly in 70-80 % of cases, and that such ability may be reinforced by practice. Such a stance is consistent with a part of the continuum hypothesis which claims that sensations, hallucinations, dreams, fantasies, etc. differ not in kind but in degree. The part we are interested in is pointing out different feelings of vivacity (Savage, 1975) between hallucinations and sensations driven by external stimuli using a correct sensory apparatus.

The second gradual range deals with ideas, connected to the notion of mental imagery. De Vito and Bartolomeo (2016) suggest that aphantasia patients do have the ability to create mental images, but believe they cannot produce the image, mostly because of external influences, such as extreme stress or anxiety ("refusing to imagine"), emphasizing that neurological studies are not sufficient for such investigations. Comparable to Weiskrantz's results in cortical blindness, Rademaker and Pearson (2012) have successfully trained people to learn how to produce mental images, considering that some aphantasia patients have that ability, albeit unconscious, and that some have it completely inaccessible. That is, even though the force of producing mental images maybe cannot be strengthened, their understanding can. Zeman *et al.,* (2016) agree that almost every clinical phenomenon exists in factitious form, but also emphasize de Vito and Bartolomeo's (2016) point that aphantasia will involve common pathways in the brain whether it is due to psychological (reversible) or structural (irreversible) causes. All their participants suffered from a life-long aphantasia, which underpins it as a stable state rather than a variable trait. Zeman *et al.,* (2016) also found that impoverishment of imagery seems to be common in congenital prosopagnosia, which points to an underlying structural cause rather than the psychogenic one.

Considering aphantasia research, it seems that we are dealing with both a degree of volition and a degree of vivacity. First, the ability to produce mental imagery may be as strong as it is in most people, and if it is a matter of a degree, then aphantasia lies at the lowest part of the vivacity interval, a claim that seems to be indicated by experimental investigations of the left fusiform gyrus in (Thorudottir *et al.,* 2020). The in-between degrees of being able to sometimes

[3]Cortical blindness is usually being analyzed using pupillometry: by measuring the widening of retinas as the response to the change of lighting conditions, which does not happen in non-cortical cases of blindness. In blindsight cases, patients' retinas respond to light intensity, movement, spatial frequency, and sometimes even color (Weiskrantz, 1990).

produce mental images or being able to produce them in different vivacity may depend on the volition aspect. As we have mentioned, aphantasia patients were still able to experience mental imagery in dreams or involuntary flashes during sleep onsets (Zeman *et al.,* 2010), which suggests that the Humean degree of force and vivacity could depend on volition and possibly external neurological factors.

Pearson (2019) mentions the other extreme – hyperphantasia – considering imagery vividness and strength at its full potential, being photo-like. If we were to formalize this notion, we would state that for any set of mental imagery *M*, a membership function μ_M on *M* is a function from *M* to the real-unit interval [0,1], where 0 is associated with aphantasia, 1 is associated with hyperphantasia, and most of other people's abilities lie somewhere in-between. Such (dis)abilities to produce mental images may be congenital (as in Zeman *et al.,* 2015) or affected by trauma (cf. Thorudottir *et al.,* 2020).

Problems in Semiotics

One additional path of future research is to see the impact of the existence of aphantasia in semiotics and linguistics since most of the language sign models refer to mental concepts related to the expression and the external reality (cf. *signifie* in structuralist linguistics[4]). Since a visual mental representation constitutes a semiotic sign, and some people do not possess such an ability, then a sign itself is either 1) an idealist generalization 2) subject to gradual reinterpretation.

Let us observe one of the most important semiotic-sign definitions in linguistics, Ogden's & Richards's (1923/1943) triangle of reference. *Thought* is reference, which is directed and organized, recorded and communicated, while *symbols* direct and organize, record and communicate, i.e., a symbol evokes the thought as a mental representation. The triangle of reference comprises symbol, referent (extra-linguistic object), and thought/reference, with three relations between them. A symbol symbolizes, and the relation between symbol and thought is a causal one. The thought is connected to the referent, either directly or indirectly, while thought and referent have no direct relations (Ogden & Richards 1923/1943). Russell (1921) has posited *images* in the mind that go through the process of mnemic causation, as a connection between a stimulus and a response. In case of repetitions, a word becomes associated with an object and invokes the same (pictorial) mnemic response as the standalone object would induce. Ogden and Richards (1923/1943) criticize Russell's idea of such intermediaries as only copies of sensory

[4]For Saussure (1916/1959), *signified* is more like an acoustic picture, but following Hjelmslev (1943/1961), signified is reconstituted as a mental concept or a mental impression. Namely, language can support any physical substance, for example, a mental image of moving hands in the case of sign languages.

experience. Such an *engram*, as they call it, does not need to replicate sensory experience but must be directed to the object by some similarity, for example, thought is directed to a flame when it is similar in certain respects to thoughts that have been caused by flame. So, for Russell, there is a necessary pictorial quality to the reference, but for Ogden & Richards, it does not have to be a necessary condition.

In both cases, the notion of aphantasia needs to be incorporated into such models. Any pictorial representation that is eager to explain how language works, needs to consider that this is not a generalized case. The intermediator may be a Saussurean acoustic image or similar sensory engrams, but the pictorial representation itself is only applicable to an idealized speaker.

Possible Issues and Further Research

Thomas (2019) states that a common view in mental-imagery accounts is that imagery, regardless of its subjective vividness, lies at the one end of a spectrum, stretching from stimulus-driven and stimulus-constrained perceptions and one and, to pure imagery, independent of any stimulus output at the other. We will not argue whether perceptions and mental images lie at the extreme parts of the continuum. To illustrate, blindsight could be interpreted both as a perception (using neurological evidence), and a completely mental phenomenon. The main issue we would like to emphasize is that wherever perceptions[5] and ideas are being situated in the spectrum (if being situated at all, and taking into account their possible overlaps), we must emphasize that their positions themselves need to be classified into further sub-spectrums. The first case, one of perception, includes physical manifestations of various reactions to different stimuli, but such reactions may also be unconscious or involuntary, as is the case with cortical blindness. The second case, one of mental imagery, also includes aphantasia, the inability to form such ideas, but also the involuntary ability to form them in sleep. Whatever the ontological status of mental imagery is, being a quasi-perceptual conscious experience and thus belonging to the range of perceptions or being a pictorial representation and thus belonging to the range of mental images, they differ amongst themselves as well in force, vivacity, and volition to a matter of a degree. This suggests Pylyshyn's (1973) famous critique of pictorial theories, in which the inner notions of mental pictures presuppose the mind's eye, which implicitly relies on a certain homunculus with mental powers. We would like to add that such a homunculus might not even have sufficient mental powers to produce such imagery at all.

[5]Being a classification issue or a regression issue. Perceptions and mental images, i.e., impressions and ideas may be different classes and a problem of classification, or a same class differing in a matter of a degree, i.e., a problem of regression.

Another issue is that even though there are neurological and psychological experiments researching the ability to form mental images, most of these rely on the Zeman *et al., Vividness of Visual Imagery Questionnaire*, supported by subjective claims of individuals, which may be affected by psychopathological issues, suggested by de Vito and Bartolomeo (2016). However, some recent advances seem to pinpoint to different brain regions associated with mental imagery. Fulford *et al.,* (2018) have shown that several posterior cortical regions show a positive correlation with imagery vividness, such as fusiform gyrus regions, posterior cingulate and parahippocamal gyri, and Thorudottir *et al.,* (2020) have identified lesions on the parts of the fusiform gyri unique to the studied aphantasia patient.

The claims made in this paper are not concerned with the ontological status of mental images/ideas, but with their range as a class of themselves, with the possibility of the class being a subclass of a larger spectrum encompassing both perceptions and impressions, analogous to Hume's division of perceptions as all mental content to impressions and ideas, which may also be a gradual interval. Even if they are on the same spectrum as perceptions/impressions are, or are completely different phenomena (pictorial or non-pictorial representations) produced by different complex networks in the background, neurological and psychological research should refocus philosophy's attention on the fact that there is another ontological level lying ahead – that of a degree of vivacity and volition – which may open new questions of whether different real values of such abilities to produce mental images imply different ontological statuses.

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