

Imaginability as Representability: A Wittgensteinian Approach to Aphantasia

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Abstract

Aphantasia, i.e., the inability to voluntarily form visual mental images, affects approximately 2 to 5 percent of the population and plays an important role in a more general debate revolving around the role of imagery for our cognition. This thesis investigates aphantasia by means of an interdisciplinary approach, combining insights from contemporary neuroscientific research with historical philosophical arguments, with a specific focus on the later philosophy of Ludwig Wittgenstein. A new theoretical concept, meta-imagination, is developed and it is argued that the concept can explain why aphantasics perform successfully on a wide range of visual imagery tasks, thus providing important implications for the more general debate about the connection between imagery and cognition.

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Abbreviations

PI *Philosophical Investigations*, ed. P. M. S. Hacker and Joachim Schulte, tr. G. E. M. Anscombe, P. M. S. Hacker and Joachim Schulte, revised 4th edn (Wiley Blackwell, Oxford, 2009)

PI II *Philosophy of Psychology - A Fragment* (previously known as Philosophical Investigations, Part II), published in *Philosophical Investigations*, ed. P. M. S. Hacker and Joachim Schulte, tr. G. E. M. Anscombe, P. M. S. Hacker and Joachim Schulte, revised 4th edn (Wiley Blackwell, Oxford, 2009)

RPP I *Remarks on the Philosophy of Psychology, Volume 1*, ed. G. E. M. Anscombe and G. H. von Wright, tr. G. E. M. Anscombe (Blackwell, Oxford, 1980)

RPP II *Remarks on the Philosophy of Psychology, Volume 2*, ed. G. H. von Wright and H. Nyman, tr. C. G. Luckhardt and M. A. E. Aue (Blackwell, Oxford, 1980)

LPP I *Last Writings on the Philosophy of Psychology, Volume 1*, ed. G. H. von Wright and H. Nyman, tr. C. G. Luckhardt and M. A. E. Aue (Blackwell, Oxford, 1982)

LPP II *Last Writings on the Philosophy of Psychology, Volume 2*, ed. G. H. von Wright and H. Nyman, tr. C. G. Luckhardt and M.A.E. Aue (Blackwell, Oxford, 1992)

Z *Zettel*, ed. G. E. M. Anscombe and G. H. von Wright, tr. G. E. M. Anscombe (Blackwell, Oxford, 1967)

Preface

Close your eyes and imagine an apple. What do you see? Which color does the apple have? How do you know it is *that* colour, e.g., crimson instead of cinnabar? How vivid is your mental image? Is it as vivid as real seeing, and how would you know *that*? And how important is your knowledge of apples for your ability to form a mental image of one? Furthermore, what is the difference between imagining an apple and visualising one? After all, have you not taken the order to imagine an apple as that to visualise one? And how does your mental image of an apple compare with mine, and how *could* we compare them?

While it may seem as if everyone has an intuitive understanding of what a mental image is or how it ‘looks like’, serious attempts at answering the questions posed above show us that the waters are much murkier than we might have initially assumed. Since our experience of our own mental images is necessarily subjective, we cannot point directly at our mental image when we are talking about it with others, as we could if we were talking about an actual image, such as a picture or a drawing of an apple. Thus, it might very well happen that you and I think that we are referring to the same thing when we talk about our mental images but that our subjective experience of them differs drastically.

These philosophical considerations, which were undertaken by the 20th century philosopher Ludwig Wittgenstein, in his posthumously published *Philosophical Investigations*, reverberate loudly in the context of the discussion revolving around a recently coined condition, called *aphantasia*, which is defined as the inability to visualise, i.e., to voluntarily form visual mental images. Central to this discussion is the finding that, in many cases, aphantasics have not noticed their inability to visualise for decades, assuming that when others talked about ‘seeing’ this or that ‘in their mind’ they were speaking metaphorically. Even more surprisingly, not only are aphantasics not gravely cognitively impaired, a conclusion that would seem to follow from the current importance attributed to mental images in the context of cognition in philosophy and cognitive science, but they are also able to successfully perform tasks that seemingly require the use of visual mental imagery, even outperforming non-aphantasics on some.

This thesis focuses on answering both the question of why aphantasics are able to successfully perform visual imagery tasks, as well as that of why the scientific community was surprised by the finding that they are able to do so. While the concept, as well as the (neuro)scientific investigation of aphantasia is only a recent topic of interest, there is a long and rich history of debates, both in philosophy and psychology, revolving around the nature and role of mental images. As we will see, Wittgenstein’s critique of the importance of mental images represents an important turning point in these philosophical debates and has also influenced subsequent debates carried out in adjacent fields, such as the decades-long so-called *imagery debate* in the field of cognitive science.

Drawing on the insights derived from the historical (philosophical) debates, with a specific focus on the arguments of Wittgenstein, and combining these with results from contemporary cognitive neuroscience, this thesis proposes a

new theoretical concept, *meta-imagination*, which will be argued to explain why aphantasics can successfully perform a range of visual mental imagery tasks, by showing that actual visualisation, opposed to the mere knowledge of how something would look like, coupled, in some cases, with an intact spatial sense, is not necessary for the successful performance of the tasks in question.

In *Chapter 1*, we will set the stage by introducing the concept of aphantasia, as well as showing that contemporary philosophy and cognitive science attribute great importance to mental imagery. Furthermore, we will look at three different ways of understanding the term ‘mental imagery’ and will introduce two approaches, namely the *phenomenological* and the *neuroscientific* approach to mental imagery, which will function as sign posts for our investigation of mental images and aphantasia in subsequent chapters. Lastly, we will motivate our focus on Wittgenstein’s philosophy and briefly discuss how a philosophical investigation can complement a (neuro)scientific one in general.

In *Chapter 2*, we will review some historical positions that philosophers took with respect to mental images, starting with Aristotle’s assertion that the soul cannot think without images, and tracing this idea through the works of the British Empiricists up to the theories of early experimental psychologists. Then, we will introduce Wittgenstein’s position, which drastically broke with the orthodoxy of assuming language to be grounded in mental images, and compare it with an even more drastic critique of mental images, namely Watson’s *behaviorism*. We will then discuss Wittgenstein’s position in detail and investigate what we can derive from it for our investigation into aphantasia. Lastly, we will review some further limitations that an approach based on introspection implies for the scientific investigation of mental imagery and aphantasia.

In *Chapter 3*, we will then discuss the imagery debate, a debate revolving around the underlying format of mental imagery, and pay close attention to so-called mental rotation tasks, i.e., tasks that require participants to rotate figures ‘in their mind’. We will review empirical evidence that shows that aphantasics successfully perform mental rotation tasks and will propose that some of the arguments brought forth by Zenon Pylyshyn, a central figure in the imagery debate, may explain these findings. Then, we will trace the imagery debate into its ‘neuroscientific’ phase and connect it with contemporary theories of mental images. Lastly, we will discuss the neuroscientific literature on aphantasia and argue that aphantasia should not be viewed as a neurological disorder.

In *Chapter 4*, we will then cash in on the insights gained from our investigation, by proposing a new theoretical concept, *meta-imagination*, which, it will be argued, can explain why aphantasics can successfully perform a wide range of tasks that were thought to require visual mental imagery, such as mental rotation, visual working memory, or questions about the visual attributes of objects. Furthermore, we will propose that aphantasia should be understood as a form of imagery that is purely conceptual, and we will argue that aphantasics can use their knowledge to compensate for their inability to visualise.

Finally, in *Chapter 5*, we will take stock, propose some directions for future research, and conclude that aphantasia should be viewed as a variety of imagination that is different, yet not inferior, to that of non-aphantasics.

1 Setting the Stage

1.1 What is Mental Imagery?

Our capacity to imagine is arguably both one of the most fascinating and challenging topics in contemporary philosophy. It is one of the most fascinating, because next to its rich philosophical history, being discussed, among others, by Aristotle, Descartes, Aquinas, Hume, Kant, Husserl and Wittgenstein, it also peaked great interest in adjacent disciplines, such as psychology and, more recently, cognitive science, making it a truly interdisciplinary subject of investigation. However, it is also one of the most challenging, because it is notoriously difficult to define and has caused great controversies whenever it surfaced.

The 21st century has witnessed a resurgence of philosophical interest in the imagination, with one theme being the idea that the imagination plays a more fundamental role for our cognition than initially assumed, with some philosophers (Asma, 2022; Clark, 2015) arguing that our ability to perceive crucially depends on our ability to imagine, and others discussing the importance of imagination for topics such as ethics¹ (Johnson, 2015) or epistemology (Kind & Kung, 2016). Meanwhile, in the context of psychology, mental imagery has been argued to play an important role for a range of cognitive and non-cognitive skills, such as decision-making (Gaesser & Schacter, 2014) or motor skills (Fontani et al., 2007), and viewed from a natural language perspective, the concept of imagination has been connected within a large network of associated concepts, such as creativity, conceivability or play-acting (Bennett & Hacker, 2022).

However, despite the current excitement surrounding the possibilities and importance of our ability to imagine for other cognitive and non-cognitive abilities, it has been argued (Kind, 2013) that, in order to account for the myriad ways in which philosophers employ imagination in an explanatory manner, we could not rely on one homogeneous mental activity alone. Thus, instead of talking about ‘the imagination’ as a sort of unified, intuitively delineated cognitive capacity or faculty, we will first make some technical distinctions.

A widely agreed upon feature of the imagination is that it is a representational state, meaning that it is directed at or about something, or, that it has *intentionality* (Brentano, 1874). One way of cutting up imagination into more digestible pieces is thus to make a distinction with respect to *what* is being represented.² Here, it is useful to compare imagination with two other representational states, namely belief and perception (Kind, 2016; Nichols, 2009).

The form of imagination that functions in a belief-like manner is referred to as *propositional imagination* (Nichols, 2009), and its content are propositions. For example, just as the proposition “Anna beats Clemens” can be the content of a belief (X believes that Anna beats Clemens) it can also be the content

¹For a treatment of the connection between imagination and ethics in the context of Wittgenstein’s *Tractatus* specifically, see Diamond (1991).

²Other attempts made at dissolving the confusion surrounding the concept include viewing imagination as varying across dimensions such as prompts, props and collaboration (Kind, 2016), or investigating the everyday language use of ‘to imagine’ (Bennett & Hacker, 2022).

of an imaginative episode (X imagines that Anna beats Clemens). However, propositional imaginings differ from beliefs in their functional role, since they have no special connection with truth (Sinhbababu, 2016) and generate different action potentials (e.g., believing that my house is on fire will cause a different reaction than imagining that my house is on fire). Although it might be thought that our imagination has no constraints, Byrne (2007) argues that it adheres to *some* logic, Nichols (2009) states that our imaginative episodes often follow orderly inference chains, and logicians have attempted to model these.³

Imagistic imagination on the other hand, can be understood to function in a perception-like manner. Perception has as its object a percept, such as an apple on the table in front of me, or a song that I listen to on the radio. On an analogy with perception, the object of my imagistic imagining is thus an imaginary percept, such as an apple that I visualize in my ‘mind’s eye’, or a song that is stuck in my head (Nanay, 2021a). This imaginary percept, so to speak, is referred to as *mental imagery* and will be at the centre of this thesis.⁴

Importantly, while most of the (philosophical) literature on mental imagery, including this thesis, investigates imagination on an analogy with visual perception (imagining is often described as visualising, picturing, or on analogy to images, pictures, etc.), it should be noted that mental imagery can occur in any sense modality, including olfactory (Stevenson & Case, 2005), auditory (Hubbard, 2010), or tactile (Yoo et al., 2003) imagery. Hence, there is an equivalent to ‘imagistic’ (visual) imagination for each of the other sensory modalities. Yet, although some of our later results may well be adapted to imagery in non-visual modalities, our considerations focus on visual imagery and therefore, whenever we are talking about mental images, imagery, etc., it should, unless stated otherwise, be understood to mean *visual* mental images, *visual* imagery, etc.

While we have already identified mental imagery as the ‘perception-like’ content of imagistic imagination, it is helpful to consider some of the different ways in which the philosophical and psychological literature uses the term ‘mental image’ or ‘mental imagery’. For this, we will borrow the tripartite distinction proposed by Thomas (2014), according to which, the term is used in one of three different, yet sometimes conflated, ways, namely as a referring to either

- (1) quasi-perceptual conscious experience *per se*; OR
- (2) hypothetical picture-like representations in the mind and/or brain that give rise to (1); OR

³For an overview of the logic of imagination, see Badura (2019). Notable articles about the logic of imagination include Wansing (2017), Berto (2017), Canavotto et al. (2022), Badura and Wansing (2021), and Casas-Roma et al. (2021).

⁴Notice that the two forms of imagining (propositional and imagistic) do not have to occur in isolation from one another. My imagining of the propositional content, say, “the cat is on the mat” may likely involve the mental imagery of a cat sitting on a mat. In fact, as we will see below, some philosophers even take a position that Gregory (2016) refers to as imagery essentialism, i.e., the view according to which “necessarily, a mental episode is an imagining only if it includes some mental imagery” (p. 103). I will have a lot more to say about the possible combinations of propositional and imagistic imagination below (section 4.1.1).

- (3) hypothetical inner representations of any sort (picture-like or otherwise) that directly give rise to (1).

The ‘quasi-perceptual conscious experience’ mentioned in (1) can be understood as an experience akin to visual sensory perception, i.e., akin to seeing. So, the experience of imagining, say, an apple is quasi-perceptual in the sense that it is (in some ways) akin to the experience of seeing an apple (this is the idea of imagistic imagination, discussed above). With respect to (2), the ‘hypothetical picture-like representations’ are to be understood as depictive representations (Kosslyn, 1996), i.e., representations that are spatially mapped onto the topographically organised primary visual cortex. So, according to proponents of (2), when the agent is imagining an apple, which she experiences as akin to seeing an apple, this is so because imagining an apple leads to a roughly apple-shaped activation in her primary visual cortex, which then gives rise to her quasi-perceptual experience, as in (1). Lastly, proponents of (3) are noncommittal with respect to the format of the representations that underlie the quasi-perceptual experience described in (1).

While we will focus on imagery as a quasi-perceptual experience per se for the majority of the first part of the thesis, we will cover the other two ways of understanding the term, as either a hypothetical inner picture- or non-picture-like representation, in the second part, by considering the so-called *imagery debate*, which revolved around the format of mental imagery (Tye, 2000). Importantly, Wittgenstein’s own definition of mental images, which we will discuss in detail below, does not fit with any of Thomas’ (2014) three proposed ways of understanding the term, since Wittgenstein does not hold the view that mental images necessarily involve quasi-perceptual conscious experience at all.

1.2 Two Ways of ‘Looking at’ Mental Imagery

The assessment of mental imagery has changed throughout history, partly as a function of the technological and methodological developments in the disciplines of psychology and neuroscience, and partly due to changes in the conceptual understanding of what mental images are (Bennett & Hacker, 2008).

Contemporary (neuro)science uses a multitude of instruments and techniques, such as PET or fMRI, which are used to assess the neural correlates of mental images (see section 3.2.2).⁵ These methods are in line with the neurophysiological approach, which emphasises the connection between mental events, such as the occurrence of mental images, and bodily events, such as brain activation. Prior to the neuroscientific method, experimental psychologists, such as Wundt or Titchener, assessed their patients verbal and non-verbal (physio-

⁵Positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) are non-invasive methods of brain imaging. In PET, regional cerebral blood flow is monitored, by recording the emission of gamma rays which occurs when radioactively labeled glucose is metabolized during neuronal activation. In fMRI, a magnetic field is used in order to assess local neural activity by means of monitoring changes in cerebral blood flow and oxygen consumption. The limitations of these approaches are discussed in section 3.3.

logical) behavior, and behaviorists, such as Watson, even argued that mental events should be reduced to external behavior (see section 2.2.1).

However, prior to behaviorism and the objective assessment of behavioral and neural correlates of mental images in contemporary psychology and neuroscience, both scientists and philosophers heavily relied on *introspection*, i.e., the subjective method of data collection in which “observers examine, record and describe their own internal mental processes and experiences.” (Colman, 2015, p. 389). In order to see how introspection featured into (philosophical) theory formation with respect to mental images, consider the following two passages, one taken out of Berkeley’s critique of Locke’s *abstract ideas*, and the other taken out of Hume’s argument for his *weak-precepts theory* (see section 2.1.2).

All I desire is that the reader would fully and certainly inform himself whether he has such an idea or no. And this, methinks, can be no hard task for anyone to look a little into his own thoughts, and there try whether he has, or can attain to have, an idea that shall correspond with the description [...] (Berkeley, 1710/1999, xii)

[W]hen I enter most intimately into what I call *myself* I always stumble on some particular perception [...]. I never catch *myself* at any time without a perception, and never can observe anything but a perception. (Hume, 1739/2003, 1.4.6)

Both Hume and Berkeley here appeal to their respective introspective experience as evidence for their position. However, while Hume merely reflects on and shares *his own* experience, Berkeley seems to assume that his experience must be shared by *everyone* (it is almost as if he wanted to shout “Just look for yourself, you will see it!”). While we will revisit and discuss the difference between Berkeley’s and Hume’s way of using their subjective experience in order to make claims about the nature of imagination below, we note here that they are two instances of a specific approach to assess mental imagery capacities, which we will refer to as the *phenomenological approach to mental imagery*.

The **Phenomenological Approach to Mental Imagery** aims at conceptualising mental images by means of reflections on data gathered via introspection. In line with the phenomenological approach, mental imagery is thus defined as “such and such an experience”.

While the phenomenological approach necessarily involved the subjective experience of the imagining individual, the advent of behaviorism in psychology initiated a trend that is still prevalent in contemporary neuroscience, namely the shift of the focus away from the subjective experience and towards objective data, such as intersubjectively observable behavior or neurological activation patterns (Bennett & Hacker, 2008, 2022). As Sacks (1998) remarks, “neuropsychology, like classic neurology, aims to be entirely objective” and therefore “excludes the psyche”, i.e., “the experiencing, active, living ‘I’” (p. 164).

Following the focus on the objective, as opposed to the subjective, we can delineate a second approach to mental imagery, which we will refer to as the *neuroscientific approach to mental imagery*.

The **Neuroscientific Approach to Mental Imagery** aims at investigating mental images by means of analysing objective data of the imaginer’s brain. In line with the neuroscientific approach, mental imagery is thus defined as “such and such a neuronal activity”.

Although contemporary cognitive neuroscience routinely combines subjective and objective methods, the phenomenological and the neuroscientific approach to mental imagery, as representing the subjective and objective extremes respectively, will provide us with useful sign-posts around which our inquiry will be structured, with us covering the phenomenological approach and its limitations in the first and the neuroscientific approach (as well as studies combining both approaches) in the second part of this project. However, our inquiry into (the nature of) mental imagery is itself only a means towards our true goal, namely to investigate the nature of a special condition, defined as the inability to form visual mental images, namely *aphantasia* (Zeman, 2020).

1.3 The Curious Case of Aphantasia

While mental imagery has an illustrious philosophical history (which will be discussed in 2.1), the first attempt at quantifying mental imagery was made by the nineteenth-century psychologist Francis Galton. In his *breakfast table questionnaire* (1880), Galton asked participants to visualize their “breakfast table as [they] sat down to it this morning” (p. 301). He then asked them to score the coloring, definition and illumination of their recollected mental image.⁶

In the process of answering the questions, some participants reported to have “no power of visualising” (Galton, 1880, p. 306). For example, one participant reported that he perceives “no individual objects, only a general idea of a very uncertain kind”, and another reported that his “powers are zero” and that he “recollects the breakfast table, but does not see it” (Galton, 1880, p. 306). Galton proposed that faint visual imagery was common among “men of science” (Galton, 1880, p. 302), the idea likely being that it is an advantage for scientific theorising to engage in abstract, rather than concrete, depictive thinking.⁷

Although mental imagery remained a topic of great interest for psychology throughout the following century (see section 2.1), the total lack of mental

⁶Note here that Galton asked his participants to conjure up an image that they have previously perceived, namely their breakfast table, which actually existed in such and such a configuration of items. The task therefore directly probes the *memory* of his participants. The participants’ performance may thus differ on tasks where they are asked to visualise specific images that they have not previously perceived. The connection between aphantasia and memory will be discussed below (see section 3.2.4)

⁷Brewer and Schommer-Aikins (2006) contested this interpretation, providing a number of exceptions to Galton’s interpretation, including Galton’s own cousin, Charles Darwin, who stated that his mental imagery of the breakfast table was “as distinct as if [he] had photos before [him]” (p. 140).

imagery reported by the participants in Galton’s experiment, was discussed less often, and without a consensus on terminology (Zeman, 2020). In fact, it was only in 2015 that Zeman et al. (2015) coined the term *aphantasia*, in order to describe a condition of “reduced or absent imagery” (p. 4).⁸

Zeman and colleagues’ investigation into what they would later term aphantasia started 5 years prior, when they (Zeman et al., 2010) reported on a patient, MX, a retired surveyor, who had lost his ability to form visual mental imagery after undergoing a remodelling of his coronary arteries. After their report on MX was covered in the popular science journal, *Discover*, twenty-one individual readers reached out to the researchers and stated that they identified with the description of MX’s case, with the important difference being that they have *never* been able to form visual mental imagery. Zeman et al. (2015) consequently tested the respondents using the *Vividness of Visual Imagery Questionnaire* (VVIQ; Marks, 1973), and referred to their condition as *congenital*, i.e., life-long aphantasia.

In the current taxonomy of aphantasia, congenital aphantasia is contrasted with *acquired* aphantasia, which itself is split into *neurogenic* and *psychogenic* aphantasia (Zeman, 2020). Neurogenic aphantasia describes cases, such as MX, where loss of imagery is sudden and can be linked with a neurological event, such as brain damage or surgery (e.g., Charcot, 1889; for a review see Farah, 1989). Psychogenic aphantasia, on the other hand, describes the sudden loss of imagery associated with psychiatric disorders, such as anxious depression or depersonalization disorder (e.g., Cotard, 1882; for a review see Zago et al., 2011) specifically. Lastly, the other extreme on the spectrum of mental imagery vividness is referred to as *hyperphantasia* and describes a condition where mental imagery is “as vivid as real seeing” (Zeman et al., 2020, p. 430).

When Zeman, Dewar, and Sala (2015) investigated their twenty-one congenital aphantasics, they noticed that there were stark differences between the subjects in other domains. For example, while some participants did not experience visual dreams, others dreamed vividly, and while some showed deficiencies in autobiographical memory, others did not. Furthermore, some participants had *total* aphantasia, meaning that they were not only unable to conjure up visual imagery, but also were unable to imagine sounds or smells.⁹

These results raise the question of what concrete implications the condition has for the general cognitive and behavioral profile of aphantasics. Especially the fact that most of the congenital aphantasics participating in the study reported that they have lived decades without even *noticing* their condition, seems to suggest that mental imagery is not as important as was previously believed. In fact, Zeman himself notes that “the discovery that some people get along fine

⁸The term “aphantasia” is inspired by Aristotle’s use of the word “phantasia” to describe our capacity for visual imagery (see 2.1). The “a” in aphantasia thus describes the absence of mental imagery, on analogy to e.g., aphasia, i.e., the absence of language (Zeeman, 2020).

⁹Throughout this thesis, whenever the term aphantasia is being used without further qualification, e.g., *olfactory* aphantasia, etc., this is to be understood as referring to people who lack (at least) *visual* imagery specifically. Furthermore, whenever the term “mental imagery” is being used, this can be understood as meaning “*visual* mental imagery” specifically.

in the absence of visualisation, and indeed, apparently, without *any* sensory imagery, is striking” (Zeman, 2020, p. 706).

While the sudden loss of imagery in acquired aphantasics, opposed to their congenital peers, usually causes significant distress, it is notable that they mostly appear to be able to adapt to their new condition (Zeman, 2020). A striking example is the case of MX himself, who, despite having lost visual imagery phenomenology, “was unimpaired on a range of standard tests of visual imagery” (Zeeman et al., 2010, p. 145). This is especially interesting because it not only seems to disprove imagery essentialism, by showing that imagining is possible in the absence of imagery, but it leads to the even stronger (and arguably initially somewhat puzzling) hypothesis that even for *visual* imagination tasks, such as mental rotation (Shepard & Metzler, 1971), mental imagery is not necessary.

Since Zeman, Dewar, and Sala (2015) have coined the term aphantasia, there has been a groundswell of both scientific and public interest in the condition. After being featured in *The New York Times*, the *BBC*, and *Le Monde*, Zeman (2020) states that his team has been contacted by around 12,000 people, who claim to recognize themselves to be either a- or hyperphantasic. Furthermore, the existence of an online *Aphantasia network*, where, next to informing oneself about the newest research and exchanging experiences with others, one can also purchase aphantasia merchandise (!), clearly indicates that what Galton has discovered around 140 years ago, resonates with the 21st century’s public. On the scientific front, neuroscientific methods that came to the fore in the 1990s, such as fMRI and PET scans, are being used in order to determine the neural correlates of both congenital and acquired aphantasia. Furthermore, the relationship between aphantasia and other cognitive functions remains a topic of interest for psychologists, as well as cognitive scientists (Blomkvist, 2022).

In the context of philosophy, the recent (re)discovery of aphantasia calls into question statements such as Aristotle’s notion that “the soul never thinks without a phantasma” (1984, 431a) and breathes fresh air into the imagery debate. Furthermore, connected with the question of the relevance of mental imagery for our everyday cognition is also a more fundamental question of how to *categorize* aphantasia. Is it a neurological disorder, similar to aphasia (a language disorder that impairs verbal expression) or merely a variety of experience, similar to, say, synesthesia (a condition where senses appear to be merged, such that a person might, e.g., perceive specific letters to be colored [Barnett and Newell, 2008])?¹⁰

It is evident that the curious case of aphantasia provides a puzzle not only for philosophers, but also for neuroscientists, psychologists and cognitive scientists alike. At the centre of it all stands the question regarding the importance of mental imagery. However, looming in the background is another question that arguably is of greater relevance for how we, as a society, are to deal with the discovery of this (new) condition, namely “*what does it mean to be aphantasic?*”.

¹⁰The way in which we handle and answer questions of this kind will undoubtedly have an important impact on how aphantasia is perceived by the public, but also for questions such as whether hypothetical ‘treatments’ may be covered by an insurance company, etc.

1.4 Why Wittgenstein?

The current thesis aims to view aphantasia through a Wittgensteinian lens. One may wonder why Wittgenstein would be fitting for the task at hand. This question can be broken down into two parts. Firstly, one may wonder whether philosophy, in general, can be of any help for a topic that by now seems so deeply steeped in neuroscience. Secondly, assuming that philosophy can be of help, why would Wittgenstein, and not, say, Aristotle or Hume, be the philosopher worth constructing our analysis around?

The first question, the one asking about the relevance of philosophy for neuroscience, is discussed at length in Bennett and Hacker’s book *Philosophical Foundations of Neuroscience* (2022). In their book, Bennett and Hacker respond to neuroscientists, such as Zeki or Crick, who prescribe philosophy a minor role, if any, in the (neuro-)scientific debate. Zeki (1999), for example, argues that philosophy’s results have been poor with respect to our understanding of the brain and mental processes, and Crick (1994) suggests that philosophers should just “learn enough about the brain to suggest ideas about how it works” (p. 41). In their response, Bennett and Hacker (2022) argue that there is an underlying conceptual confusion with respect to what the targets and tasks of philosophy are. Specifically, they propose that philosophy is not interested in empirical actualities, but rather in *logical possibilities*. Or, put slightly differently, philosophy is not concerned with matters of facts, but with *matters of meaning*.

The task of (analytic) philosophy, according to Bennett and Hacker (2022), is twofold. Philosophy’s constructive task is the investigation of concepts by means of a *logico-grammatical analysis*, i.e. an investigation into how certain concepts, such as mental imagery, are being used and what uses *make sense*. Philosophy’s destructive task is to then expose cases where these concepts are being used in a manner that *seems to make sense*, but that is nonsensical. Hence, they argue, it would be foolish to expect philosophy to propose theories for neuroscientists, because, contrary to the position of Crick and Zeki, “cognitive neuroscientists are *not* concerned with the very same problems as philosophers of mind” (p. 463). Philosophers are not (or at least should not) be interested in providing *explanations* of how the mind operates. Instead, they should concern themselves with investigating the *concepts* that underlie the neuroscientific approach. For example, while a neuroscientist may develop an experiment or a theory aimed at investigating mental imagery, the philosopher should investigate the *concept* of mental imagery itself. This is done by means of a *connective analysis*, which elucidates not only the concept in question, but also its connections with other concepts, such as, in the case of mental imagery, the concepts of perception, memory, etc. By proceeding in this manner, Bennett and Hacker (2022) argue, philosophy is able to unearth potential conceptual confusions that underlie the use of the respective concepts in neuroscientific theories.

While it may be objected that this interpretation restricts the philosopher’s task to “endless logic chopping” (Bennett & Hacker, 2022, p. 468) and concerns itself with nothing but ‘mere words’, Bennett and Hacker (2022) rightfully point

out that these ‘mere words’ provide the representational scheme that underlies the neuroscientific theories, and are therefore *fundamental* for them. Or, in Bennett and Hacker’s (2022) own words, “it would be absurd to be dismissive about the spectacles by means of which we view the world on the ground that they are merely glass and that only lens grinders should be interested in them” (p. 461). Therefore, although the current debate surrounding aphantasia appears to revolve around a neuroscientific nexus, we can nonetheless apply philosophy as a *complementary* means of analysis, which will allow us to find results that are *impossible* to find by means of a neuroscientific investigation alone.

Having answered the first question, “Why philosophy?”, we can now tackle the second question, “Why Wittgenstein?”. Incidentally, the answer to our first question partly answers the second question as well, for the perspective on the task of philosophy as logico-grammatical analysis of concepts, as outlined by Bennett and Hacker (2022), is deeply Wittgensteinian. In fact, Bennett and Hacker openly admit that “a spirit hovers over [their book’s] arguments: the spirit of Ludwig Wittgenstein” (p. 12). And indeed, Bennett and Hacker’s (2022) conceptual analysis is reminiscent of Wittgenstein’s analysis of *language games*, i.e., “language and the actions into which it is woven” (PI, §7). Furthermore, their assertion that philosophy should not aim at providing explanations can be traced back to Wittgenstein’s *perspicuous representation* (übersichtliche Darstellung), i.e., the idea that philosophers should aim for a synoptic (comprehensive) view of a concept, rather than an explanatory account (Budd, 2013). Therefore, the arguments used by Bennett and Hacker (2022) in their defence of the importance of a philosophical approach towards neuroscience, at the same time justify the use of Wittgenstein for the investigation of mental phenomena, such as aphantasia, since the approach that they defend is *his* approach.¹¹

While the foregoing discussion licenses the use of a Wittgensteinian approach to mental phenomena in general, there are more intricate reasons for the relevance of Wittgenstein in the context of aphantasia specifically. Firstly, Wittgenstein provided one of the most influential critiques of the importance of mental imagery, with some (Candlish, 2001; Nyiri, 2001) even suggesting that his critique was *the* reason for a general shift from the idea that language derives its meaning from images, to the opposite position that images derive their meaning from language. Importantly, Wittgenstein did not deny the existence of mental imagery, as, for example, Watson (1913) did, but merely criticises its supposed explanatory power (MacKisack et al., 2016), stating that “a verbal description can simply take the place of the image” (MacKisack, 2016, p. 12). Thus, not only did Wittgenstein’s critique of the importance of mental imagery seem to have predicted the “striking” (Zeman, 2020, p. 706) discovery that aphantasics perform well on a vast range of behavioral and cognitive tasks, but his notion that imagery is only *one* possible form of mental representation also provides a possible explanation for the use of “alternative strategies” (Zeman et al., 2010, p. 150) in the performance of aphantasics on visual mental imagery tasks.

¹¹The specific kind of logico-grammatical analysis advocated for by Bennett and Hacker (2022) is mostly reminiscent of the late Wittgenstein, and especially of his views in the *Philosophical Investigations* (2009) and his work on the philosophy of psychology (Budd, 2013).

Secondly, several of Wittgenstein’s thought experiments seem to directly anticipate aphantasia, including the aphantasics’ ability to perform tasks that seemingly require imagery. In §624 of *Zettel* (1981), for example, he states:

People might exist who never use the expression “seeing something with the inner eye” or anything like it, and these people might be able to draw and model “out of the imagination” or from memory, to mimic others etc. Such a person might also shut his eyes or stare into vacancy as if blind before drawing something from memory. And yet he might deny that he then sees before him what he goes on to draw.

Similarly, in §144 of the *Remarks on the Philosophy of Psychology Vol. II* (RPP II; 1980), Wittgenstein wonders:

Couldn’t there be people who could describe a person’s features in minute detail from memory, who would even say that they now suddenly know what he looks like - but who would emphatically deny, when they were asked, that at the moment they in any way “saw” the person “before them” (or anything like that)?

We can therefore see that consulting Wittgenstein in order to understand aphantasia is further justified by his preoccupation with the phenomenon *prior* to its receiving the general philosophical attention it currently enjoys.

Thirdly, Wittgenstein spent a considerable amount of ink not just on discussing imagination and mental imagery, but also on related concepts, such as perception, aspect-perception, or memory (Budd, 2013; Schulte, 1995). Therefore, his writings are a wellspring for the type of analysis advocated for by Bennett and Hacker (2022), since he provides a detailed account of the interactions and intricate relations between the concepts relevant for our understanding of mental imagery and aphantasia. For this reason, a Wittgensteinian analysis of aphantasia has the potential to compensate for the limitations inherent to the neuroscientific approach, as discussed by Bennett and Hacker (2022), by means of elucidating the concepts underlying the current debate and illuminating potential transgressions of the boundaries of sense.

Fourthly and lastly, Wittgenstein’s focus on the intersubjective nature of the use of terms, i.e., on the role that they play within the context of our everyday practices, will complement the largely either subjective (i.e., phenomenological) or laboratory-based (i.e., neuroscientific) approaches to mental imagery and aphantasia. By elucidating how aphantasics act in everyday discourses and practices involving the use and descriptions of mental imagery, we might thus be able to answer the question posed in section 1.3, namely “*What does it mean to be aphantasic?*”. And from this answers, we will then be able to derive important insights into how to categorize this new and confusing condition (e.g., as a disorder, variety of experience, etc.).

2 Looking Into One's Own Mind

Structure of Chapter Two

The goal for this chapter is to understand the results derived from, as well as the critique of, the phenomenological approach to mental imagery. In order to do so, we will proceed as follows.

In the first subchapter (2.1), we will review some of the traditional philosophical views on mental imagery and introduce some of the theories and debates associated with them. In 2.1.1 we will focus on Aristotle's views on mental imagery, and use them to introduce the *picture theory* of mental imagery. In 2.1.2 we will then discuss the views of and debates among the British Empiricists Locke, Berkeley and Hume, and introduce Locke and Berkeley's debate concerning *abstract ideas*, as well as Hume's *weak-percepts theory*.

In subchapter 2.2 we will then transition into the era of early experimental psychology and discuss Wittgenstein's views on mental imagery. In 2.2.1, after briefly introducing the *imageless thought controversy*, we will present the doctrine of Watson's *behaviorism* as a particularly extreme reaction to the controversy, and use behaviorism as a foil against which Wittgenstein's more nuanced critique will be introduced. In 2.2.2 and 2.2.3 we will then provide a reasonably thorough analysis of Wittgenstein's views on mental imagery, by first discussing his objection to the picture theory (2.2.2) and then presenting some of his considerations regarding representation and depiction in mental imagery (2.2.3). Lastly, in 2.2.4 we will briefly discuss some of the implications that Wittgenstein's approach has for the (investigation of) *aphantasia*.

In subchapter 2.3 we will then conclude our discussion regarding the phenomenological approach to mental imagery, by considering some of the critiques raised against the introspective method in the context of mental imagery, with a focus on the critique given by Schwitzgebel (2011), and we will take stock of the results that we have gained up until this point (interim summary).

2.1 Philosophical Views of Imagery Prior to Wittgenstein

2.1.1 Aristotle and the Picture Theory

There are multiple reasons to begin our inquiry into philosophical theories of mental images with Aristotle’s account. Firstly, Aristotle’s account arguably represents the first conceptualisation of the imagination (Schofield, 1978). Secondly, Aristotle’s approach provides the first instance of one of the currently most popular imagery theories, the *picture theory* of mental imagery (Tye, 2000). Thirdly, as we will see, his views on (the importance of) mental imagery carries important implications for the (cognitive) abilities of aphantasics.

Aristotle defines imagination [phantasia] as “that in virtue of which we say an image [phantasma] arises in us” (Aristotle, c. 350 BC/1984, 428a 1-2).¹² Importantly, his account of phantasia is tightly connected to his theory of perception. Aristotle’s perceptual theory depends on a matter-formism (hylomorphism), according to which all things consist of *matter*, i.e., that of which a thing is made, and *form*, i.e., that according to which a thing is part of a class of things (MacKisack et al., 2016). According to his theory, perception occurs when the form of a thing (but not its matter) is imprinted on the respective sense-organ. For example, my seeing a table is essentially the table’s form being imprinted onto my eye.¹³ The analogy used by Aristotle to describe this process is that of a signet ring being pressed into wax, imprinting its form into the wax, but losing nothing of its matter (Idib. 459b 25-32).¹⁴ The imprint (or ‘impression’) made by the thing in the sense organ is then sent through the blood stream to the *sensus communis*, the central perceptual organ (MacKisack et al., 2016).

While the *sensus communis* can generate perceptual experiences based on the movements of sensations fed to it by the sense organs (i.e., based on ‘inpouring’ sensory information registered by our senses), it can also use these same movements in order to create images [phantasmata], which are derivatives of sensations that occur in the absence of the perceived objects (Idib. 428b 12). This means that, for Aristotle, percepts and images are two different vehicles that can contain the same content, namely (the movement of) a sensation. The distinguishing factor between perception and phantasia is their vulnerability to error: while perception of proper objects is “always correct” (Idib. 427b 12), phantasia may or may not represent its content accurately, since it is not connected with, or based on, the actual external world (Modrak, 2016).

Three aspects of Aristotle’s concept of imagination and images are relevant for our current inquiry. Firstly, Aristotle thought images to be essential to our cognitive processes, stating that “the soul never thinks without a phantasma” (Idib. 421a 15-20). This is remarkable because it builds a direct connection

¹²While the translation of phantasma as “image” is the predominant one, some scholars translate phantasma as “appearance” (Lycos, 1964) or “presentation” (Beare, 1906) instead.

¹³For Aristotle, the forms of things are transmitted by the things themselves in movements, so instead of the table passively waiting to be perceived by us, it actively emanates its form towards us (MacKisack et al., 2016).

¹⁴The analogy between impressions being captured by sense organs and an object being stamped into a block of wax originally appeared in Plato’s *Theaetetus* (Burnyeat, 1990).

to Zeman’s (2020) statement that it is “striking” that “some people get along fine in the absence of visualisation” (p. 706). For if Zeman’s (2020) aphantasia is modeled on Aristotle’s phantasia, and if phantasia produces phantasmata (images) that are *necessary* for any kind of thinking, then it follows that the absence of the ability to produce mental imagery (i.e., aphantasia) should imply an inability to think. Therefore, the expectation of aphantasia to carry calamitous consequences for cognitive functionality appears to be *built in* the very term, at least if Zeman, Dewar and Sala (2015) follow Aristotle’s lead. But even if they merely used the term, without attaching any of the conceptual weight to it, the importance associated to images by Aristotle without a doubt reverberated throughout the history of philosophy (Thomas, 2014).

Secondly, Aristotle’s account can be seen as the first instance of a *picture theory* of mental images. This can be understood on two levels. On the phenomenological level, Aristotle argues that the process of forming a visual mental image gives rise to experiences akin to those associated with seeing pictures. He states, for example, that “we can call up a picture, as in the practice of mnemonics, by the use of mental images” (Idib. 427b 19).¹⁵ On the mechanistic level, Aristotle can be viewed as arguing that phantasmata represent their intentional objects in a depictive manner (see section 1.1). While Aristotle did, of course, not state that mental images are mapped onto the topographically organised visual cortex, his use of Plato’s signet ring analogy suggests that percepts and phantasmata share the same spatial format. Specifically, Aristotle’s view that the forms of objects are imprinted onto our senses and that the *sensus communis* can generate these same movements and corresponding forms at will, which gives rise to quasi-perceptual experiences, can be seen as a precursor of the pictorialist view that perceptions are topographically mapped onto the primary visual cortex and that an agent can generate the same patterns on her primary visual cortex by a voluntary use of later brain regions.

Thirdly, Aristotle’s account of the mind proposes that linguistic meaning, i.e., the meaning of spoken words, derives from mental images, with spoken words functioning merely as symbols for imagery (De Anima 420b 29-32; Modrak, 2016; Thomas, 2014). The idea that words derive their meaning from imagery remained popular a long time after Aristotle, two examples being Russell’s imagistic account of thinking, as outlined in his *Analysis of Mind* (Russell, 2022), and Price’s account of meaning in *Thinking and Experience* (Price, 2013). (As we will see below [in section 2.3], the imagistic theory of thinking and meaning, was thoroughly attacked by Wittgenstein in his *Philosophical Investigations* [2009]). The idea that images are *fundamental* for the meaning of words, once more shows the importance that the Aristotelian approach attaches to the phantasmata. While Plato did not ascribe much importance to images, Aristotle thus presents the foundation for the subsequent attention paid to the imagination, initiating the picture theory and declaring phantasmata necessary to all thinking (cf. Thomas, 2014).

¹⁵In ancient Greece, mnemonics were of essential importance, and specific mnemonic techniques, such as the ‘mental palace’ would be used in order to memorize whole speeches by means of visualisation techniques (Yates, 1966).

2.1.2 British Empiricism, Abstract Ideas and Weak Percepts

For the British Empiricists, every thought is taken to consist of either *simple ideas*, which are “exact copies” (Hume, 1739/2003 1.1.1) of impressions, i.e., “all our sensations, passions and emotions, as they make their first appearance in the soul” (Ibid), or *complex ideas*, which are themselves constructed out of simple ones (Ibid). Although there is some disagreement among scholars, the orthodox way of interpreting ideas is to view them as mental images (Thomas, 2014; Ayers, 1993; White, 1990, but see Yolton, 1996 and Lowe, 1995 for dissenting views). Locke, for example, states that ideas are “the pictures drawn in our mind” (Locke, 1689/1975 2.10.5), and that ideas such as “nurse” or “mother” are “framed in [the minds of children]” and represent “like pictures of them” (3.3.7), and Berkeley, in his *Principles* (Berkeley, 1710/1999), argues that we can form complex ideas in the same way that we can cut and paste pictures on paper.¹⁶ Thus, by viewing ideas as the foundation for thought, and by viewing ideas essentially as mental images, or ‘pictures in the mind’, Locke and Berkeley not only support Aristotle’s notion of the phantasmata being necessary for thinking, but also, in line with his picture theory, view mental images as inner pictures, on which operations such as cutting and pasting can be conducted.

While Locke and Berkeley agree with each other on the importance of ideas for thought, as well as on their picture-like characteristics, Locke’s concept of *abstract ideas* is vehemently opposed to by Berkeley (Thomas, 2014). In order to understand Locke’s concept of abstraction, consider the following section from his *Essay Concerning Human Understanding*, as quoted by Tye (2000, p. 6):

[T]he mind makes the particular ideas received from particular objects to become general; which is done by considering them as they are in the mind such appearances, separate from all other existences, and the circumstances of real existence, as time, place, or any other concomitant ideas. This is called ABSTRACTION, whereby ideas taken from particular beings become general representatives of all of the same kind.

Thus, for example, when I am perceiving a particular cat, say, David Lewis’ Bruce Le Catt, the copy of said percept is an abstracted version of that cat; it is an *abstract cat*, which loses its ties to the specific time and place where I have perceived it. Furthermore, it may also lose some of its particular characteristics, such as its color, since the abstract cat does not necessarily have to have any particular color (Tye, 2000). A direct corollary of Locke’s concept of abstract ideas is that if we call an image, for example, of a cat to mind, this image must not be a particular image of a particular cat. It was this specific characteristic of Locke’s abstract images that Berkeley, in section 10 of his *Principles* (Berkeley, 1710/1999), vehemently disagreed with, when he stated the following:

¹⁶The idea that images are being created out of a combination of copied percepts retained in memory was previously proposed by Hobbes, who stated that complex ideas are, “as when, from the sight of a man at one time and of a horse at another, we conceive in our mind a centaur” (Hobbes, 1651/1894, p. 28).

I can imagine a man with two heads, or the upper parts of a man joined to the body of a horse. I can consider the hand, the eye, the nose, each by itself abstracted or separated from the rest of the body. But then whatever hand or eye I imagine, it must have some particular shape or color. Likewise the idea of a man that I frame to myself must be either of a white, or a black, or a tawny, a straight, or a crooked, a tall, or a low, or a middle-sized man.

Thus, Berkeley does not allow for any indeterminacy in our mental images. This is relevant in the context of our current inquiry, because while there are extremes of mental imagery capacity, namely hyperphantasia on the one, and aphantasia on the other side, there is a wide spectrum of reported mental imagery vividness that lies in between (Zeman, 2020). Specifically, many people experience *hypophantasia*, a condition of reduced, but not absent, mental imagery. Consider, for example, one of the participants from Galton’s (1880) breakfast table questionnaire, who states that “very occasionally an object or image will recall itself, but even then it is more like a *generalised image than an individual one*” (p. 313; emphasis added). Furthermore, Tye (2000) argues that Berkeley’s account only works if he views mental images as “fully determinate images” (p. 8), since sketches can also lack details, such as the skin color of a man. However, I think that Tye’s argument is mistaken, since any part of any sketch on a paper has *some* color. For example, I might sketch the outline of a man on a white piece of paper and state “I have not yet colored his skin”, but if one looks at the piece of paper, at the location where the skin color *would be*, one would still perceive a color (in our case white, due to the whiteness of the paper). Thus, even sketches are, in some sense, fully determinate images.¹⁷

Another British Empiricist, David Hume, while siding with Berkeley against Locke’s abstract ideas (1739 1.1.7), still allows for unclear or faint imagery, stating that ideas are “the faint images of [impressions] in thinking and reasoning” (Idib. 1.1.1). Thus, Hume states, our experience of impressions and ideas do not differ in kind, but only in *degree*, namely in their degree of *vivacity* or *force and liveliness* (Ibid). This is an example of what is more generally referred to as the *weak percept theory*, according to which “imagining is like perceiving in less than optimal conditions” (Tye, 2000, p. 1).¹⁸ The weak percept theory, next to the picture theory, was the most popular theory of mental imagery until the 20th century (Tye, 2000), and, as we will see below (see section 3.1), Hume’s idea that imagination resembles (a weak form of) perception reoccurs in contemporary accounts of mental imagery (e.g., Kosslyn, 1996; Pearson, 2019).

¹⁷Notice here that ‘fully determinate’ does not mean ‘involving all elements’ but instead ‘determined with respect to the (un)involvement of any element’. For while it is true that some sketches or smileys are omitting certain details, such as the nose, the image is nonetheless fully determinate with respect to whether any of these elements is depicted or not. For example, the size of the nose might not be determined, because there is no nose depicted in the image, but the image is determined with respect to the question whether there is a nose or not. And if there is a nose, then its size is determined, unless it is partly occluded from view.

¹⁸Interestingly, the weak percept theory does not seem to apply at least to hyperphantasics, since the condition is defined as mental imagery that is “as vivid as real seeing” (Zeman, 2020, p. 430). Rather, the hyperphantasics’ phenomenology seems to be accounted for by Berkeley.

2.2 Wittgenstein's Critique of Mental Images

2.2.1 Wittgenstein and Behaviorism: a Comparison

When Wilhelm Wundt opened the first psychology laboratory in Leipzig in 1879, ushering in the field of experimental psychology, the influence of thinkers such as Aristotle and the British Empiricists, especially with regard to the importance of mental imagery, was evident. Psychologists, such as Wundt and Titchener, attributed to mental images the central role in the mind, and William James followed the Empiricists' tradition of referring to images as ideas (Thomas, 2014). In fact, when Oswald Külpe, a former student of Wundt, stated that he had found evidence for thought *without* any accompanying images (recall Aristotle: "the soul never thinks without a phantasma"), this led to a dispute, which was later referred to as the *imageless thought controversy*, the debate of whether thought without any imagery was possible (Thomas, 2014).

A particularly extreme response to the imageless thought controversy came from America at the beginning of the 20th century, when Watson's manifesto (1913), which marked the beginning of the era of *behaviorism* in psychology, declared mental images as the prime example of the malaise of psychological methodology (i.e., introspection), which behaviorism was supposed to eradicate. While we will have more to say on (the problems of) introspection at a later point (see section 2.3), a short look at the stance that Watson's behaviorism takes against imagery, will be useful as a foilage against which Wittgenstein's own critique of imagery can be laid (especially so since Wittgenstein himself, as we will see, explicitly distances himself from behaviorism [PI §§307-308]).

In order to get a taste of Watson's behaviorist critique of mental images, consider the following passage from his *The ways of behaviorism* (Watson, 1928), as quoted in Kosslyn, Thompson and Ganis (2006, p. 5):

What does a person mean when he closes his eyes or ears (figuratively speaking) and says, "I see the house where I was born, the trundle bed in my mother's room where I used to sleep - I can even see my mother as she comes to tuck me in and I can even hear her voice as she softly says good night"? Touching, of course, but sheer bunk. We are merely dramatizing. The behaviorist finds no proof of imagery in all this. *We have put all things in words, long, long ago.*

When Watson says that we have put all the supposed instances of imagery in words, 'long, long, ago', he is alluding to the idea that our very thinking is essentially talking to oneself, in the form of "sub-vocal word-behavior" (1928, p. 238). And hence our talk of imagery, of us 'seeing' our mother, etc., is merely a dramatized account of a story that we tell to ourselves (very, *very* quietly). In general, Watson's behaviorism attacked the prevailing orthodoxy, defended, among others, by Wundt, of viewing psychology as the study of consciousness, by reducing psychology's task to "the behavior of the human being" (Watson, 1928, p. 2), denying the very *existence* of (the phenomenology of) any inner mental states, such as mental images or thinking, in the process (Graham, 2023).

In §307 of the *Philosophical Investigations* (PI; 2009), the fictitious interlocutor asks Wittgenstein whether he is not a “behaviorist in disguise”, to which Wittgenstein responds that if he were to speak of mental processes as fictions, then merely as a *grammatical fiction*.¹⁹ In order to understand both the accusation of the interlocutor and Wittgenstein’s response, we must briefly consider the context in which PI §307 occurs, namely the *private language argument*.

The private language argument is a famous section of the *Philosophical Investigations* which contains, among other things, Wittgenstein’s argument that our psychological vocabulary (e.g., sensations, mental images, etc.) cannot take the form of a *private language*, i.e., a language that is unsharable and unteachable on principle because it only relates to the speaker’s private experiences. While it is obvious that we can talk about sensations and mental images (after all, we do this all the time), Wittgenstein attacks the intuitive idea that we can talk about these mental phenomena by means of referring to our own private experience of these. This intuitive idea is grounded in the Augustinian picture of language, according to which “the words in language name objects” (PI §1), coupled with the additional assumption that, in the case of our psychological vocabulary, the objects named by the psychological words are inner, i.e., epistemically private, experiences. Wittgenstein attacks this idea by showing that a *private ostensive definition*, i.e., focusing one’s attention on an inner experience and thinking to oneself “I call *this* ‘S’”, has no criteria for identity (cf. PI §253), since the only possibility would be to check its identity by means of a *private rule*, which would be “as if someone were to buy several copies of today’s morning paper to assure himself that what it said was true” (PI §265).

One crucial conclusion that Wittgenstein draws from these considerations is that the terms of our psychological vocabulary have to be defined by means of reference to *behavioral criteria*, instead of private experiences. And this is why the interlocutor, in PI §307, accuses Wittgenstein to be a “behaviorist in disguise”, who argues that “everything except human behavior is a fiction”, thus mirroring the behaviorist sentiment that the inner (i.e., the mental) is reducible to the outer (i.e., the behavioral). However, this is not Wittgenstein’s claim. Instead of arguing, as Watson does, that the sensations, mental images, etc., are mere fictions, i.e., do not exist, Wittgenstein merely states that they are *grammatical fictions*, which are forced onto us when we adopt the Augustinian (referential) picture of language. Thus, it is not a fiction to think that there *are* inner mental processes (sensations, mental images, etc.) but it is a fiction to believe that our psychological terms are *referring* to these private experiences.

¹⁹While we will here compare Wittgenstein’s critique of mental images with Watson’s *psychological behaviorism* (the target intended by the interlocutor in PI §307), one may also compare Wittgenstein’s approach with *logical behaviorism*, another form of behaviorism, according to which sentences using mental state terms should be replaced by ones using behaviorist/physicalist terms instead (Graham, 2023; see Carnap’s *Psychology in Physical Language* [Carnap, 1933] as an example of logical behaviorism; see Hacker [2019, ch. 3, §3] for a discussion on Wittgenstein’s approach and logical behaviorism). Yet another form of behaviorism, also supported by Watson, is *methodological behaviorism*, which is a normative theory that deals with the scientific conduct of psychology and postulates that mental processes, states, or events fall outside of the domain of psychological inquiry (Graham, 2023).

The private language argument shows us that a language can only be developed in a community, meaning that the only elements that can be featured in any language must be observable and thus, in the case of our psychological vocabulary, behavioral in nature. For any *language-game*, i.e., “language and the activities into which it is woven” (PI §7), including the language game of imagining, must follow rules that can be checked by other members of the community. Hence, “an inner process stands in need of outward criteria” (PI §580), otherwise it could not participate in our language games. And once we have established (and learned) the characteristic outward criteria that correspond to the inner processes (e.g., the verbal report that one gives of his imagining), we can play the corresponding language-games, i.e., we can speak about the inner processes (e.g., one’s imagining), in terms of these criteria (e.g., one’s report).

In order to show the faulty nature of thinking of the terms of our psychological vocabulary as names that refer to private objects, Wittgenstein proposes a famous thought experiment, known as the *beetle in a box argument*.

Suppose that everyone had a box with something in it which we call a “beetle”. No one can ever look into anyone else’s box, and everyone says he knows what a beetle is only by looking at *his* beetle. - Here, it would be quite possible for everyone to have something different in his box. One might even imagine such a thing constantly changing. - But what if these people’s word “beetle” had a use nonetheless? - If so, it would not be as the name of a thing. (PI §293).

The upshot of the argument is that if the word “beetle” has a use in the community, i.e., if the practice involving the use of the word ‘has a point’,²⁰ then its use must follow publicly observable rules, which determine whether someone uses the word correctly. For if there were no way of determining whether one is playing the language-game correctly, then there would be no point in playing the language-game at all (in fact, there would be no language-game, and thus no practice, to begin with). But these publicly observable rules constituting the practice cannot have their origin in the individual person’s reference to their own beetle, since this would be equivalent to giving a private ostensive definition. Thus, the rules that determine the correct use of the word must be based on characteristic outward criteria that constitute the practice. This does not mean that there is no beetle in the box; it only means that instead of being grounded in the private experience of the thing in the box, the language-game is grounded in the use that the word has for the community, i.e., the *practice involving the use of the word*, instead of the inner object, determines its meaning (cf. PI §43).

In conclusion, while Watson’s behaviorism denies the very existence of any internal processes, reducing them solely to behavior, Wittgenstein, while stating that behavior is the only observable component associated with the inner processes, does not deny or question their existence as such, only their role as objects of reference, attributed to them by the Augustinian picture of language.

²⁰A practice ‘having a point’ should here be understood in a broad sense. Wittgenstein includes telling jokes or acting in a play as examples of language-games (PI §23).

2.2.2 The Myth of the Inner Picture

After having discussed Wittgenstein’s position with respect to mental processes in more general terms, we will now focus on his critique of the picture theory of mental images specifically, by outlining what he refers to as the “myth of the inner picture” (RPP II §109).

When Wittgenstein considers mental images, he is not interested in “what images are or what goes on when one imagines something”, i.e., he is neither interested in the nature of mental images, nor in the accompanying (physiological) mechanisms, but instead focuses on “how the word ‘imagination’ is used” (PI §307). Thus, his inquiry is a “grammatical one”, meaning that it aims to shed light on misunderstandings “concerning the *use of words*” (PI §90). So, in order to understand Wittgenstein’s critique of the picture theory, we must consult his *perspicuous representation of the imagination*, i.e., his attempts at elucidating the (grammatical) connections between the language-game of imagining and other related language-games, especially that of *seeing* (Budd, 2013).

The picture theory of mental images uses the concept of seeing, in order to describe the imaginer’s relation to their mental image (Tye, 2000). More specifically, the picture theorist models the process of visualisation on the process of seeing a picture with one’s eyes, in the sense that the act of visualising X is understood as seeing an inner picture of X with the ‘mind’s eye’. For example, just how someone can inspect a picture by shifting one’s eyes across the picture, Kosslyn argues that one can “*inspect* the imagined pattern by shifting the attention window over it” (Kosslyn et al., 2006, p. 144). Furthermore, this inspection of the mental image, i.e., the ‘inner picture’ according to the picture theorist, can be used to derive information about the object that is being visualised, for example, “if one were asked what shape are a cat’s ears and so visualized a cat’s head and examined the shape of its ears” (Idib).

However, Wittgenstein vehemently rejects the idea that we can use the concept of seeing when we talk about our mental images, because, according to him, the language-games of ‘seeing’ and ‘visualising’, although sharing a connection (RPP II §71), have some fundamental differences (RPP II §63, §§70-71, §75).

„Seeing and imagining are different phenomena.“ - The words „seeing“ and „imagining“ are used differently. „I see“ is used differently from „I have an image“, „See!“ differently from „Form an image!“, and „I am trying to see it“ differently from „I am trying to form an image of it“. (RPP II §75)

According to Wittgenstein, an important difference between the concepts of visualising and seeing is that visualising is *subject to the will*, whereas seeing is not (RPP II §63). This can be seen, he argues, by the fact that it makes sense to order someone to banish their image (e.g., by telling them to think about something else), while it does not make sense to tell someone to banish what they see (RPP II §89/Z §633, §91; RPP I §653).²¹ Similarly, the order “Visualize

²¹Banishing a visual impression here does not mean something like ‘looking away’ or ‘closing

this!” makes sense (RPP I §759; RPP II §83), but it doesn’t make sense to give someone the order “See this!”, in the sense of “Make this appear in your sense impression!” (RPP II §124/Z §642).²² This connection of visual images and the will is directly connected with another difference between seeing and visualising, namely that images do not tell us anything, neither right nor wrong, about the *external world* (RPP II §63, §80). For if I see a yellow umbrella, then, unless it is merely a fancy²³, this tells me that there *is* a yellow umbrella (in the external world; cf. RPP I §702). However, if I merely *visualise* a yellow umbrella, this does not tell me anything about the external world, because what I visualise is subject to the will and the external world is independent of my will.²⁴

So far, Wittgenstein’s arguments are still consistent with the picture theory, since the picture theorist would subscribe to the idea that our inner pictures are subject to the will, i.e., that we create them voluntarily, and she would likely also agree with the idea that one’s visualising an object has no consequences with respect to the actual state of affairs in the external world.

However, Wittgenstein diverges from the picture theorist when he warns us not to think that images and percepts are the same *state of consciousness*, with the only difference being that images are subject to the will, whereas percepts are not (RPP II §78, §84, §124). Specifically, he stresses, we should not succumb to the idea that the will were a sort of machinery which produces ‘inner pictures’ that are exactly like visual impressions.

If then one said: „Images are inner pictures, resembling or exactly like my visual impressions, only subject to the will“ - the first thing is that this doesn’t yet make sense. (RPP II §124/Z §642)

To say that imagining is subject to the will can be misleading, for it makes it seem as if the will were a kind of motor and the images were connected with it, so that it could evoke them, put them into motion, and shut them off. (RPP II §78)

What Wittgenstein is warning us about here, is the idea that visualising itself involves a form of seeing. Specifically, he warns us against the idea that the act of visualisation is a two-step process which involves 1) using the will

one’s eyes’. Rather, it means to change the *things* that one is seeing (RPP II §91), for example altering the events that one sees in a movie (cf. RPP I §653). One possibility for altering what one sees that Wittgenstein considers is the intake of hallucinogenics (“‘Move what you see.’ It might also mean: take something that influences your visual impression”, RPP II §127).

²²However, it does make sense to give someone the order “Look there!”. This is because, while seeing is a passion, looking is an action (I will elaborate on this distinction below).

²³For Wittgenstein, a fancy is not a mental image, but rather a perception that we misinterpret (Budd, 2013). So if I fancy seeing a yellow umbrella, then this is different from me visualising a yellow umbrella, since visualising is subject to the will, whereas fancying is not (cf. RPP II §98/Z §634). And fancies are yet different from hallucinations, because when we fancy seeing something we are seeing something wrongly (e.g., I see a doll and fancy it to be a human being), while when we are hallucinating we see something that is not there at all.

²⁴That the external world is independent of our will is necessary, because in order for our concepts (e.g., ‘red’, ‘round’) to carry *any* meaning, we must be able to point at things that are observable by *multiple* observers and hence not just in our imagination (cf. RPP II §92).

to produce an inner picture and 2) seeing the inner picture that the will has produced. Or, to put it differently, he warns us against thinking that we see the inner picture that we give to ourselves by means of the will in the same way that we would see a picture in the external world with our eyes. For the idea that the will is a motor which produces inner pictures *for us to see*, puts us in a passive relation with respect to our mental images. However, as Wittgenstein points out, visualising is an *activity*, since “the concept of imagining is rather like one of doing than of receiving” (RPP II §111) and the forming of mental images “is not something that happens to us” (RPP II §83),²⁵ which distinguishes it from seeing, which is a *passion*, i.e., something that happens *to us* (cf. RPP II §124). Or, put in a different way, what differs between seeing and visualising is that the visualiser does not, at any point in the process of visualising, stand in the relation of an *observer* with respect to his images; instead, the active relation to his images follows from his role of being their *creator* (cf. RPP II §111).

The difference between visualising and seeing with respect to the action-passion divide (or the creator-observer divide) now shows us that it is impossible to imagine an object while also seeing it (cf. RPP II §63; Budd, 2013). For if visualising is an *action* and seeing is a *passion*, then we cannot see what we are visualising, since one cannot have both an active and a passive relation to the same experiential content at the same time (Budd, 2013). Similarly, since one cannot both stand and not stand in the relation of an observer to the same experiential content (at the same time), it is impossible for one to see what one imagines. And this result has an immediate and obvious corollary for the way that the picture theory talks about mental imagery. For if image and percept are intrinsically different (not just extrinsically different, i.e., different with respect to the way they come about), then using the concept ‘seeing’, which belongs to the domain of perception, in order to refer to mental images, affords a grammatical confusion, i.e., a mistake brought about “by certain analogies between forms of expression in different regions of our language” (PI §90).

A picture theorist may now want to respond that of course we are not *really* seeing the inner pictures, in terms of ‘seeing-in-the-world’, but instead have an experience that is just like ‘seeing-in-the-world’, only that it occurs in the mind. So they might want to say that we are ‘seeing-in-the-mind’ with respect to the inner picture. However, one must be careful here to not make the mistake of thinking that ‘seeing-in-the-world’ and ‘seeing-in-the-mind’ are both instances of the category of ‘seeing’. For the proposed sub-category ‘seeing-in-the-world’ is what we call ‘seeing’, and ‘seeing-in-the-mind’ really just is what we call ‘visualising’. And thus the supposed concepts of ‘seeing-in-the-world’ and ‘seeing-in-the-mind’ are still fundamentally different (cf. RPP II §§71-2).

²⁵Of course, in certain extreme situations, such as when people experience visual intrusions as part of a post-traumatic stress disorder, they may very well experience the intrusive images as something that *happens to them*; after all, they are suffering *from* them! However, this does not damage Wittgenstein’s point too much, because most of the time we indeed have *some* control over our mental images. Furthermore, Wittgenstein does allow for exceptions in the language games (“A game allows for borderline cases - a rule for exceptions. But the exception and the rule could not change place without destroying the game” [RPP II §145]).

The mistake of the picture theorist is precisely that they use the concept of seeing, thereby invoking the idea that there is something that can be seen, something that we can look at in our mind. They postulate the two-step process of visualising and seeing (what one visualises) and thereby sneak in, so to speak, the ‘inner picture’ as *that which is seen*. However, if we understand that ‘seeing-in-the-mind’ simply is visualising, which is fundamentally different from seeing, and if we then collapse the supposed two-step-process of ‘seeing-what-one-visualises’ into the singular process of visualising, which finds its expression in the *descriptions* that we give, then the need for the ‘inner picture’ disappears.

Imagine human beings who, from childhood up, make drawings on all occasions where we should say they are imaging something. [...] But doesn't the ordinary human being does something quite similar? He doesn't draw indeed, but he ‚describes his image‘, i.e., instead of drawing, he *speaks*. [...] Must I assume that he *reads off* this description, these gestures from something? What is there to be said for this? - Well, perhaps he *says* „I see him before me!“ and then he represents him. But if, instead of this expression, I had taught him to say „Now I know what he looks like“ or „Now I can say what he looks like“ - then the dangerous picture would be eliminated. (Tennis without a ball.)²⁶ (RPP I §360)

So, the “myth of the inner picture” (RPP II §109) is caused by the idea that visualising involves the concept of seeing *something* in one’s mind, and the ‘inner picture’ (as analogous to the external picture that can be seen) then takes the place of that something that we have supposed to be referring to when we talk about the things that we imagine. In this sense, Wittgenstein’s critique of the picture theory can be understood as being analogous to the beetle in the box argument (see section 2.2.1). In both cases, we assume that when we are using a word (“mental image”, “beetle”), we are referring to a private experience (the ‘inner picture’, the ‘thing in the box’). However, in both cases, it is not the inner ‘thing’ that constitutes the meaning of the word but the practices into which the use of the word is woven, i.e., the rules of the respective language-games. Therefore, in both cases, Wittgenstein does not deny the existence of the ‘inner something’ but the idea that it serves as a referential object.

In conclusion, following Wittgenstein, we see that the mistake of the picture theorist lies in their interpreting the report of the imagining, which may occur in the form of “I see...”, as a reference to an inner picture, which can be seen, instead of viewing the expression as part of the language-game of imagination, in which we may also use alternative expressions, such as “Now I know...”, etc.²⁷

²⁶‘Tennis without a ball’ is a thought experiment, in which Wittgenstein invites us to imagine a game where “[t]he players move around on a tennis court just as in tennis, and they even have rackets, but no ball” and each player “reacts to his partner’s stroke as if, or more or less as if, a ball had caused his reaction” (LPP I §854). Wittgenstein then compares ‘tennis’ with ‘tennis without a ball’ and concludes that although there exist some similarities between the two games, they are nonetheless “*fundamentally different*” (LPP I §854).

²⁷I will analyse and discuss the special relationship between the act of forming a visual mental image and that of using one’s knowledge below (see sections 3.1.2 & 4.2.1).

2.2.3 Wittgenstein on Representation and Imaginability

With Wittgenstein's critique of the picture theory in place, we can now attempt to understand his own (initially somewhat cryptic) definition of mental imagery.

A mental image is the image which is described when someone describes what he imagines. (PI §367)

In order to understand this definition, it is helpful to think of somebody sketching what she is imagining (cf. RPP I §360), thus creating an 'outer picture' (i.e., a drawing).²⁸ According to Wittgenstein, this 'outer picture', unlike the supposed 'inner picture', is a representation of what her mental image is about, since it *describes* what she imagines (PI §280). So, her drawing and her mental image have the same intentional content (i.e., are about the same thing). And even though visual impressions and mental images are fundamentally different (see 2.2.2), they are tied-up in *this* way, namely that "[t]he same description can represent both what I see and what I imagine" (RPP II §69, cf. §113).

If one says, „the experiential content of seeing and having an image is essentially the same“, then *this* is true insofar as a painted picture can represent both what one sees and what one has an image of. Only, one mustn't allow oneself to be deceived by the myth of the *inner picture*. (RPP II §109)

So, does her drawing of what she imagines show me what she is imagining? In a way it does, since it represents what she imagines. However, Wittgenstein points out that a mental image does not represent its content, i.e., the object that it is about, by means of *resemblance* between it and the object (RPP II §63, PI II §17). So, I cannot tell what she is imagining simply by identifying what her drawing resembles. Instead, it is her *intention* that determines what her drawing (and therefore her mental image) is about (LPP I §§310-1, §§317-8).

Image and intention. Forming an image can also be compared to *creating* a picture in this way - namely, I am not imagining whoever is like my image; no, I am imagining whoever it is I mean to imagine. (RPP II §115)

What makes my mental image of him into an image of *him*? Not any pictorial likeness. [...] If you want to know whom he meant, ask him! (PI II §17)

Wittgenstein thus ascribes to the imager *first-person authority* with respect to what her images (or the expression/description of these) are about. So, if I would, with the intention of drawing my fiancé, end up with a drawing that bears a striking resemblance to the Cheshire Cat from *Alice in Wonderland*,

²⁸Recall that such a drawing cannot be a *copy* of some sort of 'inner picture', since there does not exist a method of projection that could tell us whether such a 'copying process' would be successful (cf. PI §260; see section 2.2.1).

and someone were to ask me what makes this a drawing of my fiancé, I could answer “My imagination” (cf. LPP I §311). And if he were then to ask why, I could reply “Because I say so, and what I say is decisive” (cf. LPP I §811).

However, Hacker (2019) argues that although the imaginer has first-person authority with respect to what they imagine, Wittgenstein still allows for the possibility that someone might imagine something *wrongly*. For example, if I were to draw my mental image of N but somehow end up with a drawing that resembles M in every detail, then this does not mean that my mental image *really* is about M; it is still about N, but it means that I imagined N wrongly.

One might wonder how Hacker’s comment regarding the possibility to imagine something wrongly can be reconciled with the imaginer’s first-person authority. In a first step, it is important to notice that even in the case which Hacker describes, where a person imagines N but draws an exact resemblance of M, they still retain first-person authority with respect to what their image is about (as Hacker states, the drawing is still about N). Thus, what the other agent would really mean by saying “You imagined N wrongly” is not “You were not imagining N” but rather “What you have drawn does not resemble N”.

But now, by recalling that a language-game always has a point, we can also see that the judgment “You imagined N wrongly”, which might be uttered in cases where the description/drawing of one’s imagination of something does not resemble the thing, is itself bound up with a specific type of the language-game of imagination, which we might call ‘describing something as it actually looks like’. An example would be cases where a bystander of a crime uses visualisation in order to give a description for a police sketch. Here, if the bystander would start to describe the criminal by stating “She had four paws, a long tail and a menacing smile”, then (unless the criminal was a cat), the use of visualisation *in this context* would miss the point, which is to describe someone in such a way that it resembles them as much as possible (which, in turn, contributes to the goal of catching the criminal). Hence, giving a description that does not (or cannot) resemble the criminal amounts to a rule-break in this language-game.

However, imagine now that the bystander seeks therapeutic help in order to deal with the trauma of witnessing the crime and an art therapist tells them to draw the criminal. Here, if the person would make a drawing of a black cat (e.g., because the criminal was swift and dressed in black),²⁹ then the art therapist would not say “You imagined it wrongly”, because the point is not to produce a drawing that resembles the actual looks of the criminal. Or, to put it differently, the point of the practice is not to represent something as it was, but as it was *to them*, i.e., the point is to produce an *impressionistic* drawing.³⁰

²⁹Notice here that drawing/describing the criminal as a cat because she was swift does resemble the criminal in some sense, namely it resembles her swiftness. However, it does not resemble her in the way that is required in the police sketch context. So, it is not even the case that the bystander’s description broke the rule of the language-game because it did not resemble the criminal but rather because it did not resemble her *in the right way*.

³⁰So, if we consider again the case where I draw my fiancé as the Ceshire Cat and somebody asks me what makes this drawing a drawing of my fiancé, there are two possibilities. Either there is a confusion with respect to the language-game we are currently playing, where he thinks that we are playing one of the ‘police sketch’ kind and I am playing that of the ‘art

I describe a room to someone, and then get him to paint an *impressionistic* picture from this description to show that he has understood it. - Now he paints the chairs which I described green, dark red; where I said “yellow”, he paints blue. - That is the impression which he got of that room. And now I say: “Quite right! That is what it looks like.” (PI §368)

What Wittgenstein is saying here is that in the specific context of the practice of painting an impressionistic picture of the room, the person behaves *according to the rules*. For in order to notice a rule-break, one must first be conscious of what type of language-game is being played, and this is usually determined by the (goal of the) presenting context (e.g., police sketch, art therapy, etc.). Thus, Hacker’s comment that someone can imagine something wrongly is correct insofar as it states that one can break the rules of the presenting language-game that involves imagination. However, the kind of rule break that he discusses (e.g., one’s drawing of N resembling M) has nothing to do with the language-game of imagination as such, but rather with a specific type of language-game which involves an act of imagining, e.g., one of the ‘police sketch’ type (opposed to, e.g., the ‘art therapy’ type). Or, to put it in another way, whether something is being done wrongly can only be determined relative to a specific set of rules, and this set of rules varies between different (types of) language-games.

Therefore, we see that there is not just one language-game of imagination, which has a certain fixed set of rules that are universally applicable to all cases of imagining, but rather that there is great multitude of language-games which involve acts of imagination, each with their own goal, practice and set of rules.

Media of Representation

At multiple times throughout his work, Wittgenstein criticizes the idea that the inner (i.e., private) experience of a mental image has a special representational status, by arguing that other forms of representation, such as verbal descriptions, sketches, and even finger motions in the air, can take the place of the image.

Suppose that while imagining, or instead of imagining, someone were to draw, even if only in the air with his finger. [...] It is just as if he had given a verbal description, which, after all, can also *take the place* of the image. (PI II §18)

It is no more essential to the understanding of a sentence that one should imagine something in connection with it than that one should make a sketch from it. (PI §396)

therapy’ kind, or, in the case that we both know that we are playing the ‘art therapy’ kind of language-game, he wants to inquire about my reasons for depicting my fiancé as a cat, i.e., he wants to learn more about my fiancé. And notice that if I would, in the second case, reply by saying “Because I say so, and what I say is decisive”, I would actually be missing the point.

There are at least two different (but not mutually exclusive) ways of interpreting these passages. The first interpretation runs along the lines of the beetle in the box argument. Recall that we compared the (inner experience of a) mental image with the ‘thing in the box’, and that we said that nobody can look at someone else’s mental image directly. From this, we concluded that the language-games involving the mental image must be determined by the (goals of the) practices in which the acts of imagination occur. And so, as long as the members of a community can communicate about their imaginings according to the rules of the respective presenting language-games, the nature of the mental image plays no role. Hence, on this interpretation, acts such as describing or sketching, i.e., inter-subjectively observable characteristic behaviors, take the explanatory place that was falsely attributed to the (private) mental image.

However, another possible interpretation of these passages is that the notion of an inner picture is not just misleading if we construe it as a referential object but that, since what we represent as mental image can, in fact, be expressed by means of a number of representative media other than pictures, such as verbal descriptions and finger motions, the medium of the mental image itself (i.e. the private experience) might be non-pictorial. On this reading, since an image can represent a description and vice versa, a sort of ‘inner description’ or ‘inner finger motion’ might take the place of the ‘inner picture’.³¹ As we will see, this interpretation has a close connection to the *imagery debate*, which revolves around the representational format underlying mental images (see section 3.2.1).

In the context of the condition of aphantasia, this second reading has the important implication that even if aphantasics are unable to form visual mental images, they might still be able to compensate for this shortcoming by means of using alternative media to represent the content of their imaginings, meaning that the ability to imagine is not tied to the pictorial representational medium.

Instead of „imaginability“, one can also say here: representability in a particular medium of representation. (PI §397)

But there is another interesting suggestion that Wittgenstein makes with respect to the variety of media of representation, namely that just because people may use (forms of) expressions for their mental imagery that are different from our own, we should not necessarily view these “as consequences or expressions of (inner) processes which are of a different nature from ours” (RPP I §656). This opens up the idea that what differs between an aphantasic and a visualiser may not be the internal process, but rather the external medium of representation, i.e., the way they choose to *express* themselves. For although there may be people that “would emphatically deny, when they were asked, that at that moment they in any way ‚saw‘ the person ‚before them‘ (or anything like that)” (RPP II §144), that must not necessarily mean that their imagery differs in any significant way from that of those who happily use phrases such as “I see...”.

³¹Importantly, this would change nothing about the fact that using the ‘replacement’ of the inner picture, so to speak, as a referential object would still amount to a mistake equal to the myth of the inner picture, meaning that an inner description is no more or less a referential object than an inner picture is, and the private language argument loses nothing of its force.

Interestingly, Wittgenstein even argues that how specific people are *used to* express themselves with respect to their imaginings, e.g., using expressions such as “I see...”, or referring to images as ‘weak precepts’,³² may merely be the result of a *poetic expression*, rather than something that has been learned.

„If I shut my eyes, there he is in front of me.“ - One could suppose that such expressions are not learned, but rather poetically formed, spontaneously. That they therefore „seem just right“ to one man and then also to the next one. (RPP II §117)

In conclusion, by drawing our attention to the large variety of representative media, as well as the arbitrariness with respect to the inner processes associated with our respective expressions, Wittgenstein loosens the grip that any specific way of expression, such as the use of “I see...” has on our understanding of what mental images are. He frees us from the “myth of the inner picture” (RPP II §109), which was as pervasive in the early experimental psychologists as it was in the philosophies of Aristotle and the British empiricists, and his critique of mental imagery opens us up to a broader view of what mental images *can* be.

2.2.4 Wittgenstein and Aphantasia

Throughout his discussion of mental imagery, Wittgenstein describes thought experiments that seem to anticipate the reports of (some) aphantasics.³³

Couldn't there be people who could describe a person's features in minute detail from memory, who even say that they now suddenly know what he looks like - but who would emphatically deny, when they were asked, that at that moment they in any way ‚saw‘ the person ‚before them‘ (or anything like that)? (RPP II §144)

People might exist who never use the expression “seeing something with the inner eye” or anything like it, and these people might be able to draw and model “out of the imagination” or from memory, to mimic others etc. Such a person might also shut his eyes or stare into vacancy as if blind before drawing something from memory. And yet he might deny that he then sees before him what he goes on to draw. But what value need I set on this utterance? Should I judge by it whether he has a visual image? (Z §624)

³²It will be noticed that we have not thus far discussed Wittgenstein's views on the weak-precepts theory. The reason for this is that, based on our preceding analysis (especially 2.2.2), it should be obvious that Wittgenstein rejects it, since the weak-percepts theory proposes that perceptions and images differ only in their vivacity, but not in kind (Tye, 2000), and Wittgenstein argues that percepts and images *do* differ from each other in kind (i.e., fundamentally). But Wittgenstein also *explicitly* rejects the theory (“Auditory images, visual images - how are they distinguished from sensations? Not by ‘vivacity’.” [RPP II §63; see also RPP II §142]).

³³It is important to keep in mind that aphantasia is a very diverse category and that aphantasics differ in the ways they describe their absence of imagery (cf. Zeman, 2020).

Wittgenstein calls the question of whether people may exist who deny the presence of visual imagery phenomenology in terms of “seeing something with the inner eye” (Z §624) while still *performing* in a way that is indicative of mental imagery (e.g., people who are able to describe a person’s face, mimic others, etc.) an “important question” and even wonders what reasons we have “to believe that this is not the case for all of us” (RPP II §144). Does this mean that he thus anticipates results showing that aphantasics, such as MX, are able to perform a variety of tasks that were thought to require mental imagery?

Fox-Muratton (2021) argues that Wittgenstein’s thought experiment “does not show that mental imagery does not exist” (as we have seen in the comparison between Wittgenstein and Watson; see 2.2.1), but that “there is no proof or reason to suppose that [mental imagery] is necessary” (p. 20). However, Wittgenstein’s motivation might actually have been even more subtle, and his intention likely was not to describe what contemporary psychology understands as cases of aphantasia. For recall that he argued that using the expression “I see...” with respect to mental imagery is only one possible way of expressing what one imagines (see 2.2.3), meaning that, although the people in his thought experiments vehemently deny ‘seeing something with the inner eye’, that does not mean that they do not have any visual mental imagery. Rather, it means that they reject this (picture-theoretic) way of expressing their imagery.

Wittgenstein’s critique of the custom of reducing visual imagery expression to “I see...”, and especially his views on the ‘myth of the inner picture’ (see 2.2.2), are nonetheless extremely relevant for the current debate, since the view of the mental image as ‘inner picture’ appears to be prevalent in both the parlance and assessment of aphantasia. Consider, for example, the version of the *Vividness of Visual Imagery Questionnaire* (VVIQ; Marks, 1973) that is featured on the website *aphantasia.com*. In the questionnaire, every question starts either with “Think of...” (e.g., “Think of some relative or friend whom you frequently see.”) or with “Visualise...” (e.g., “Visualise a raising sun.”) and ends with “Consider the *picture that comes before your mind’s eye*.” (“Vividness of Visual Imagery Questionnaire”, 2022; emphasis added). Similarly, Zeman routinely uses the expression ‘blind mind’s eye’, thus spreading and reinforcing the narrative of the mental image as ‘inner picture’ that can be ‘seen’ by the ‘mind’s eye’ (e.g., Zeman, 2020, 2021; Zeman et al., 2015; Zeman et al., 2018).

However, if we follow Wittgenstein’s suggestion that some people *with* imagery may object to/not identify with the idea of ‘seeing an inner picture with their mind’s eye’, we should assume that the wording of the questionnaire and the descriptions of aphantasia in the scientific literature may lead to an increased *false positive rate* with respect to the (self-)diagnosis of aphantasia.³⁴

³⁴We will consider the other method of assessment, namely the neuroscientific method, in the next part of the thesis. For the moment it is important to note that for many people who self-diagnose (in the absence of any neuroscientific evidence) based on the results of a test that uses rather limiting wording, or who are exposed to a specific (picture-theoretic) *picture* of the condition, may draw wrong conclusions about their own capacity for visualisation. It is important to stress that my arguments here are *not* to be understood as a sort of ‘aphantasia scepticism’, arguing that everybody has *some* visual imagery, but instead aim to show that

Another important consideration that follows from Wittgenstein’s account is that even if someone lacks mental imagery, that does not mean that they cannot perform certain tasks, such as identifying an object. For Wittgenstein shows us that we do not identify an object (e.g., a cube) by means of access to a sort of ‘inner sample’ (e.g., an inner picture of a cube), since there does not exist a reliable method of projection, only ‘private’ rules [PI §139]). This rejection of the idea that imagery is *necessary* for a meaningful interpretation of objects already fends off some of the most cataclysmic consequences that people might expect aphantasia to entail (and that appear to be entailed by statements such as Aristotle’s [1984] “the soul never thinks without a phantasma” [421a 15-20]).

Fox-Muraton (2021) proposes that, viewed from a Wittgensteinian perspective, one way of understanding the difference between aphantasics and people with mental imagery is that aphantasics lack “the possibility to play certain types of language games related to imagination, visualisation or representation” (pp. 16-17). However, the fact that many congenital aphantasics (including Fox-Muraton herself) state that they “only learned there was something different about them when they read or heard about the discovery of aphantasia” (Fox Muraton, 2021, p. 10), seems to suggest that many aphantasics *are* able to participate in those language games, although they might, of course, have connected a different experience or interpretation with them. I will consider the question of whether aphantasics can successfully participate in what I will refer to as the *language-game of visualising* in more detail below (see section 4.1.2).

At the end of her paper, Fox-Muraton (2021) invokes the beetle in a box argument, stating that “aphantasia could be described as a state in which the box is always empty” (p. 21). However, describing aphantasia by means of invoking the analogy to a box without a beetle arguably is the result of a reluctance to truly let go of the referential model. For referring to aphantasia as the absence of something is built on the referential model, with the mere difference that instead of believing to be pointing at something, one believes to be pointing at nothing. However, pointing at nothing is still very different from not pointing *at all* (cf. PI §304: “It’s not a Something, but not a Nothing either”).

Arguably, the more important point that we can draw from the beetle in a box argument is that no one can look into someone else’s mind. And this holds true even though, as we will see, contemporary neuroscience has made impressive developments with respect to looking into other peoples’ *brains* (this will be the theme of the subsequent part of this project). For even access to the brain cannot be equated with access to the subjective experience, meaning that, in the phenomenological sense, mental images remain private and thus can only be shared by means of observable behavior, such as drawing or describing.

In conclusion, although Wittgenstein might not have had the aphantasic community in mind when he developed his perspicuous representation of the imagination, or his private language argument, his considerations provide us with useful pointers with respect to our investigation of aphantasia, especially with respect to the supposed role of mental images for our imaginings.

there might be *details* and *nuances* that the current approach to aphantasia overlooks.

2.3 Limitations of the Phenomenological Approach

Let us now return to the phenomenological approach that we have defined at the beginning of this chapter. Recall that the phenomenological approach to mental imagery *aims at conceptualising mental images by means of reflections on data gathered via introspection*. The implicit idea behind this approach is that my subjective experience of imagery can tell me something about the nature of (my) imagination. We can divide this idea into a weak and a strong claim.

The **Weak Phenomenological Claim** states that based on one's own imagery phenomenology one can make definitive statements about one's own imagery capacity.

The **Strong Phenomenological Claim** states that based on one's own imagery phenomenology one can make definitive statements about everyone's imagery capacity.

To understand the distinction, take the example of Locke stating that he can form 'abstract ideas' (see section 2.1.2). Under both the weak and the strong phenomenological claim, it follows that if Locke states that he can form abstract ideas, then *someone* can form abstract ideas (i.e., reports about one's own imagery capacity accurately reflect one's own capacity). However, only under the strong claim it would also follow that *everyone* can form abstract ideas (i.e., subjective experience implies generalisable claims).³⁵

Staying with the debate about abstract ideas, we see that the strong claim cannot account for the disagreement between Locke and Berkeley. For if Locke states that he *can* form abstract ideas and that means that everyone can form abstract ideas, and if Berkeley states that he *cannot* form abstract ideas and that means that nobody can form abstract ideas, then we run into a contradiction (everyone can and cannot form abstract ideas). Thus, if we can draw conclusions from imagery reports about imagery capacity *at all*, then heterogeneity of imagery capacity follows and the strong phenomenological claim fails.

With respect to the weak phenomenological claim, we have to ask ourselves whether we have sufficient reason to think that our imagery reports accurately represent our respective imagery capacities. According to Schwitzgebel (2011), confidence in our own imagery reports may be unwarranted for a number of reasons. Firstly, Schwitzgebel (2011) argues that the VVIQ has historically been inconsistent in predicting performance on objective visual imagery tasks, such as mental rotation tasks, with two reviewers (Ernest, 1977; Richardson, 1980) even denying any relationship between between subjective reports and objective

³⁵'Everyone' here refers to people that do not suffer from severe neurological disorders. This has a direct relevance for the neuroscientific analysis of aphantasia that we are going to conduct in the next part of the thesis. For if aphantasia were a neurological disorder, then statements such as "people can visualise x" would be accurate, because they would refer to people with a usual cognitive make-up (i.e., without a specific neurological disorder). If, however, aphantasia is not related to gross neural abnormalities or damage, then the sentence "people can visualise x" would not be accurate, because aphantasics would be located within a broad spectrum of imagery capacity, rather than as a separate, 'disabled' group.

performance (for a meta-analysis, see McKelvie, 1995). And although some more recent studies do report a relationship between the VVIQ and objective imagery tasks (e.g., Petrova and Cialdini, 2005; Lobmaier and Mast, 2008; Hills et al., 2008), other studies report either no relationship (e.g., Wyra et al., 2007; Mohr et al., 2009; Gemignani et al., 2006) or mixed results (e.g., Mast et al., 2006; Carretti et al., 2007), thus showing a general lack of consensus with respect to the VVIQ's reliability.

Secondly, Schwitzgebel (2011) argues that a range of other factors may distort the (distribution of the) results in imagery research. For example, he discusses an experiment (Intons-Peterson, 1983) where *experimenter expectations* were shown to influence the outcome of a mental rotation task. In the study, the experimenters (advanced undergraduates) were either led to expect good or bad results from their participants, and the performance of the participants reflected these expectations, showing that the experimenters (non-)verbal behavior apparently communicated these expectations to the participants.³⁶ Furthermore, a general unwillingness to publish negative results (known as the *file-drawer problem*) may further favor the publication of positive results in imagery research (Chara, 1992), thus distorting the proportion of positive and negative findings with respect to a correlation between subjective and objective imagery measures (cf. Schwitzgebel, 2011).³⁷ Schwitzgebel (2011) thus concludes:

Are people, as Galton assumed, accurate judges of their own imagery experiences? I have offered some grounds for pessimism: the ease with which most people can be brought to confusion or uncertainty about substantial features of their imagery experiences when confronted with questions [...], the incredible diversity of imagery reports [...], and the apparent lack of any systematic relationship between differences in imagery report and differences in performance on any sort of objective cognitive tests. [...] I recommend pessimism only as the most plausible interpretation of the evidence. (pp. 49-50)

Schwitzgebel also considers the possibility that the vast differences in imagery reports observed in Galton's (1880) study could be due to differences in verbal expression or interpretation, stating that "respondents interpreting 'vividness' differently or using different standards for the comparison of clarity may have similar experiences, which they apprehend accurately and yet describe differently" (p. 53). However, although he considers the lack of clear reporting

³⁶Seeing that even implicit expectations from the experimenters can influence the participants, we should be even more cautious when considering how the way that tasks are framed can create expectations in the participants. For example, when being asked whether they "see x clearly or not", participants may feel the expectation to view their imagery as an 'inner picture' and may not report an experience that falls outside of this specific frame.

³⁷Another factor that Schwitzgebel (2011) points out is *reactivity* between subjective and objective imagery measures. For example, doing poorly on a visual memory task (objective imagery task) may lead one to be inclined to consider oneself as a poor visualiser *in general*, meaning that one's performance on the specific task may influence one's answers to questions on the VVIQ (subjective imagery task). Conversely, filling in the VVIQ first may also create expectations about one's performance on subsequent imagery tasks (Schwitzgebel, 2011).

standards to be “hugely problematic” (p. 53), he states that debates such as those between Locke and Berkeley are not reducible to “disputes merely over the use of words” (p. 54). So, instead of claiming that there would be no correlation between subjective and objective measures on imagery at all, Schwitzgebel’s position is rather that we are overly optimistic with respect to *how* accurate our subjective reports relate to objective measures on imagery capacity. Therefore, while not rejecting the weak phenomenological claim completely, we should be at least cautious with the extent of explanatory and/or predictive force that we attribute to the findings of our subjective (introspective) investigations.

A discrepancy between subjective reports and objective measures of imagery is also at play in the case of Wittgenstein’s thought experiments (RPP II §144; Z §624), where people perform as if they had imagery (e.g., describing/drawing a face from memory serving as an objective assessment of visual memory), while reporting that they do not ‘see’ anything in their imagination. We have considered above (2.2.4) that this might merely reflect a difference in expression (these people rejecting the expression “I see...”), rather than in actual imagery capacity. This could explain the lack of a consistent correlation between subjective and objective measures, because subjective measures may be interpreted differently by participants.³⁸ However, it might also be argued that objective imagery tasks (e.g., mental rotation, visual memory) do not correlate consistently with subjective reports, because focusing on *visual* imagery is too narrow. So, instead of the subjective tests, such as the VVIQ, being too murky, maybe the objective tasks simply assess a more general form of *imaginability*, i.e., a form of representability that does not need to be limited to being pictorial in form.

Interim Conclusion

In this part of the thesis, I presented and criticized what I have referred to as the phenomenological approach to mental imagery, i.e., the use of our own introspection (or subjective reports in general) for the conceptualisation of our imagery abilities. By analysing Wittgenstein’s views on the image, I showed that the way we talk about imagery may imply ontological commitments with respect to our imagery theories (e.g., the ‘inner picture’). Furthermore, we have seen that subjective reports do not consistently correlate with objective measures of imagery capacity. However, based on our analysis of Wittgenstein’s account, I argued that this might be the case because objective imagery tasks might assess a more broad notion of imagination than merely visual imagery.

With respect to aphantasia, I have argued that there might be a danger in presenting a limited (picture-theoretic) notion of mental imagery in the context of the diagnosis of the condition. Furthermore, I have proposed that aphantasics might use representative media other than visual imagery in order to represent the content necessary for performance on visual mental imagery tasks.

³⁸There was indeed a participant in Galton’s (1880) study who outright rejected the expressions used in the experiment, complaining that “these questions presuppose assent to some sort of a proposition regarding the ‘mind’s eye’ and the ‘images’ which it sees” (p. 302). Thus, the participant does not even get to the assessment stage, because he disagrees with the very setup of that stage. To him the question of how clear he sees his images, makes no sense.

3 Looking Into Others' Brains

Structure of Chapter Three

The goal of this chapter is to determine the extent to which neuroscientific findings can explain the accompanying phenomenology (or absence of phenomenology) of visual mental imagery.

In subchapter 3.1, I will first introduce both sides of the imagery debate (3.1.1), as represented by Stephen Kosslyn (pictorialism) and Zenon Pylyshyn (descriptonalism) and will then discuss two paradigm cases of the debate, namely mental rotation and mental scanning, in order to outline the respective explanations that both sides provide for the empirical evidence (3.1.2). Furthermore, I will evaluate the empirical findings on the performance of aphantasics on mental rotation tasks and discuss a possible explanation of how aphantasics *might* solve mental scanning tasks. Lastly, I will tease the concept of *meta-imagination*, which will be thoroughly discussed in the last part of the project.

In subchapter 3.2, I will consider a core concept of Kosslyn's quasi-pictorial account, namely his *visual buffer*, and show how this concept is connected to the currently dominant model of visual mental imagery, the *reverse hierarchy model* (3.2.1). Then, I will turn to the contemporary debate concerning the role of the primary visual cortex for visual mental imagery and will evaluate some of the criticism raised against the reverse hierarchy model (3.2.2), especially in connection with lesion studies. I will then discuss the literature on neural correlates for both acquired and congenital aphantasia (3.2.3) and end the subchapter by quickly considering the connection between aphantasia and memory (3.2.4), and the question of whether aphantasia is merely unconscious imagery (3.2.5).

Finally, in subchapter 3.3, I will discuss some of the limitations and potential pitfalls connected with the neuroscientific approach to aphantasia and will draw some tentative conclusions regarding the question of whether aphantasia, based on the available evidence, should be viewed as a neurological impairment.

3.1 The Imagery Debate

3.1.1 Pictorialism and Descriptivism

The *imagery debate*, which started in the 1970s and, despite one side’s repeated proclamations of having ended it (Kosslyn, 1996; Pearson and Kosslyn, 2015), arguably still persists today (Langland-Hassan, 2022), is about the question of how mental images are represented in the brain. Importantly, the debate is not about whether people experience mental images or not (both sides agree that the phenomenology of mental images is pictorial), but instead revolves around the question of what underlying *format* mental images have. On the one side of the debate are the pictorialists, represented by Stephen Kosslyn, who argue that the underlying format of mental images is depictive. On the other side, opposed to the pictorialists, are the descriptivists, represented by Zenon Pylyshyn, who argue that the format of imagery is propositional in nature (Tye, 2000).

When the pictorialists say that the underlying representational format of mental images is depictive, they mean that “each portion of the representation is a representation of a portion of the object such that the distances among portions of the representation correspond to the distances among the corresponding portion of the object” (Kosslyn et al., 2006, p. 198). This means that mental images, just like pictures, are representations “of magnitudes by magnitudes” (Peacocke, 2019, p. 52), meaning that magnitudes, such as distances between points on the object that the picture depicts are represented as distances on the picture itself.³⁹ It is in *this* way that the pictorialists think of mental images as ‘inner pictures’ or ‘quasi-pictures’ (Kosslyn, 1996, 2001).

The pictorialist’s idea that the shape of the (imagined) object is represented qua shape (which follows from distances being represented qua distances) falls in line with Aristotle’s signet ring analogy (see 2.1.1). Furthermore, pictorialists follow Hume when they state that “a mental image occurs when a representation of the *same type* created during [...] perception is present but the stimulus is not actually being perceived” (Kosslyn et al., 2006, p. 4; emphasis added). While we will discuss Kosslyn’s version of the picture theory, the ‘visual buffer’, in more detail in section 3.2.1, it should already be noted that the general idea is that mental images are being ‘projected’ onto an ‘inner display’ in the early visual cortex, which is also involved in perception, the only difference being that perception accesses the display bottom-up, whereas imagination accesses it top-down (Kosslyn et al., 2001; Kosslyn et al., 2006).⁴⁰

It is important to note that pictorialists do not deny that the brain may use a propositional format to represent some information. Instead, they argue that a depictive format is a sui generis form of representation that exists *next to* a propositional one, meaning that humans can use at least two forms of

³⁹Note that a propositional format does not represent magnitudes as magnitudes. The sentence “Point A is 5 cm next to point B”, for example, represents the fact that the two points A and B (on the object) are 5 cm apart, but it does not represent this in cm.

⁴⁰As we will see in section 3.2, the idea that perception and imagination are using the same neural substrate, involving, among other regions, the primary visual cortex, is a point of contention in contemporary neuroscience (Pearson, 2020)

mental representation (Pearson & Kosslyn, 2015). This is precisely what the descriptionists argue against (Pylyshyn, 2002, 2003).⁴¹ Instead of allowing for an additional depictive format, descriptionists try to show that imagistic reasoning “involves the same mechanisms and the same forms of representation as are involved in general reasoning” (Pylyshyn, 2002, p. 158).⁴² Therefore, the underlying question of the imagery debate is whether the experience of a mental image is merely an epiphenomenal side-effect of a propositional operation, or an instantiation of a depictive *sui generis* form of representation (one that is part of our “cognitive architecture” [Pylyshyn, 2002, p. 160]).

Pylyshyn (2002) refers to the idea that there is only one format of representation as the ‘null hypothesis’ and his work largely focuses on showing how empirical results from the pictorialist side can be explained without invoking a separate depictive form of representation.⁴³ His approach, independently of whether there actually is a separate depictive format or not, is of great relevance for our investigation of aphantasia. On the one hand, if there is only one (propositional) format and the experience of mental images is indeed epiphenomenal, it would explain why aphantasics are performing so surprisingly well on tasks that seemingly require (the experience of) visual imagery (e.g., Zeman et al., 2010).⁴⁴ On the other hand, even if the descriptionists are wrong and there is indeed a depictive format, the explanations proposed by Pylyshyn (1981, 2002, 2003) might still offer us suggestions for alternative strategies (i.e., strategies that do not rely on making use of the depictive format) that aphantasics could use to solve tasks that non-aphantasics use by means of the depictive format to which aphantasics seemingly have no access.⁴⁵ In any case, aphantasia research might profit greatly from investigating the arguments of pictorialists and descriptionists, and the proponents on both sides, in turn, may benefit from considering possible implications that aphantasia may have for their debate.

⁴¹The historical context of the start of the imagery debate plays an important role here. At the time that Kosslyn proposed that mental images may have a depictive (analog) format, computer science was working hard on a digital computational functionalist theory of the mind. Kosslyn’s suggestion that the digital format might not be sufficient to account for the mechanisms of the mind threatened this approach and the response by Pylyshyn (1973) was motivated by the desire to defend a unified propositional (digital) conception of the mind (this is also why Tomas [2014] refers to the imagery debate as the analog-propositional debate).

⁴²The descriptionists do not explicitly state what the underlying propositional format of “general reasoning” consists of (one candidate might be Fodor’s *mentalese* [Fodor, 1975]), but instead argue that it needs to meet certain conditions, such as “productivity, compositionality, and systematicity” (Pylyshyn, 2002, p. 180), which are not met by depictive representations.

⁴³This approach has led some (Kosslyn et al., 2006; MacKisack et al., 2016) to criticize the descriptionists for merely explaining empirical results from the pictorialists post hoc, without presenting their own alternative theories and predictions.

⁴⁴Interestingly, the idea that mental images are only the by-products of an underlying (digital) computing process reflects how many aphantasics describe their condition, when they use the “unplugged monitor” metaphor of a well-functioning computer whose monitor is unplugged, in order to explain their experience (aphantasia.com, 2023).

⁴⁵An alternative explanation might be that aphantasics are simply unconscious of their (use of their) mental images (Nanay, 2021). If this were the case, they might still be able to reap all the rewards associated with the depictive format, but are merely unaware of their performative success being attributable to this format. We will discuss this possibility below.

3.1.2 Mental Rotation and Mental Scanning

We will now consider two paradigm cases of the debate, including the experiments conducted on them and the explanations provided for their results. Firstly, we will consider Shepard and Metzler’s *mental rotation* results (Shepard & Metzler, 1971), which contributed to a reinvigoration of picture theories after they have fallen out of fashion due to the critiques from behavioral psychologists like Watson and Skinner (see 2.2.1) and philosophers such as Wittgenstein (see section 2.2.2) and Ryle (1949). Secondly, we will look at Kosslyn’s *mental scanning* results (Kosslyn et al., 1978), which eventually led him to develop his ‘visual buffer’ version (Kosslyn, 1996) of the picture theory.⁴⁶

Mental Rotation

In mental rotation tasks (Shepard & Metzler, 1971), participants are presented with drawings of three-dimensional figures, such as those in Figure 1 below, and are asked whether two of the presented figures are the same figure, only differing in their angle of rotation. In their experiments, they measured the amount of time it took participants to carry out the rotation task and found that the time taken by the participants to solve the task corresponded linearly to the angle needed for the corresponding rotation. These results were interpreted (both by Shepard and Metzler [1971] and by the pictorialists) to show that the participants rotated the figures ‘mentally’ or ‘in their head’ (Thomas, 2014).

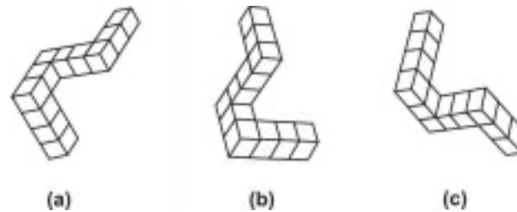


Figure 1: An example of the kind of figures used in Shepard and Metzler’s (1971) mental rotation experiments. (From Pylyshyn, Z. [2002] *Mental imagery: In search of a theory. Behavioral and brain sciences, 25(2)*, 157-182.)

Pylyshyn (2002, p. 165), while granting that the phenomenology during mental rotation tasks indeed suggests that one is rotating the figure mentally, states that the important question is not “whether we [...] imagine rotating a figure, but whether we solve the problem by means of the mental rotation”. He argues that while it seems to us as if we were rotating a rigid 3-D form continuously, studies monitoring eye-movements (Just and Carpenter, 1976; Hochberg

⁴⁶Kosslyn first developed a computational visual buffer theory (Kosslyn and Shwartz, 1977) and only latterly a neurological one (Kosslyn, 1996). Due to the focus of this section being neuroscientific and Kosslyn’s own view of the neuroscientific theory as being an improvement over the computational one, we will here only focus on his neurological version.

and Gellman, 1977) show that participants look back and forth between the two figures in question repeatedly while carrying out the task. As a possible explanation for the results derived from the eye-movement studies, Pylyshyn proposes that mental rotation might take the form of successive iterations of a (neural) mechanism that computes the rotation of a single vertex at a time and does not rely on a depictive representation (e.g., Marr and Nishihara, 1978). Pylyshyn (2002, p. 165) thus concludes that “no conclusions concerning the format of image representations, or the form of their transformation follow from the rotation results” and that this shows us that “treating the phenomenology as explanatory does not help us understand why or how the behavior occurs.”

Fortunately for us, the mental rotation task discussed by Pylyshyn (2002) has been tested with aphantasic participants. In the case of acquired aphantasia, Zeman and colleagues (2010) report that their subject, MX, although being slower on the task than the non-aphantasic controls, had a higher accuracy rate. Interestingly, MX stated in the debriefing session that he “was attempting to match individual blocks and angles perceptually when making his decision” (Zeman et al., 2010, p. 152), thus indicating that he might indeed have used a strategy similar to that proposed by Pylyshyn. In the case of congenital aphantasia, Pounder et al. (2022) compared the performance of 20 life-long aphantasic subjects with 20 control subjects that had regular imagery and were matched for age and IQ. Their results showed that while there was no significant difference in reaction time between the initial aphantasic and control groups, singling out a severe sub-group of aphantasics (i.e., those with the lowest possible VVIQ score), led to a significant difference. Furthermore, as was the case for MX, the aphantasic group showed higher accuracy than controls across all levels of difficulty on the mental rotation task. Lastly, Crowder (2018), who tested 40 self-reported aphantasics (without making a distinction between acquired and congenital aphantasia), also reports that the aphantasic group showed higher accuracy and slower performance than the controls.⁴⁷ We can therefore conclude that, despite taking more time than normal visualisers, aphantasics perform successfully (i.e., achieve accurate results) on mental rotation tasks.

In interpreting their results, both Crowder (2018) and Pounder et al. (2022) suggest that the successful performance of aphantasics on mental rotation tasks might be due to their use of *spatial imagery*, a category of imagery that includes representations of spatial structures, motion and location, and is seen as separate from *object imagery*, which describes more visual, pictorial representations, including color and texture (Chabris et al., 2006). This suggestion falls in line with the finding that aphantasics report intact spatial imagery abilities (Bainbridge et al., 2021; Dawes et al., 2020). Furthermore, Liesefeld and Zimmer (2013) even suggest, on both behavioral and neuroscientific grounds, that performance on mental rotation tasks *in general* is reliant on spatial imagery and

⁴⁷While Pounder et al. (2022) used a cut-off score of 25 on the VVIQ to classify participants as aphantasic, Crowder (2018) only classified those who scored the lowest possible score, 16, as aphantasic. Therefore, Crowder’s (2018) sample only included what Pounder et al. (2022, p. 186) referred to as a “severe sub-group”. This lack of a clear cut-off for classification of aphantasia in the literature might lead to conceptual confusion.

that only orientation-dependent information is included in the relevant representations, thereby suggesting that Pylyshyn (2002) might be right in arguing that the phenomenology in normal visualisers during mental rotation tasks does not help us understand the actual processes that occur.

However, if mental rotation does indeed rely solely on spatial imagery, and if aphantasics possess normal spatial imagery abilities, as is suggested by their self-reports, we still need to account for the differences in both reaction time and accuracy between aphantasics and normal visualisers.⁴⁸ One way of explaining these differences may be to argue that the accompanying phenomenology in normal visualisers during the task suggests to them a preliminary (pictorial) solution, before the actual (potentially propositional) mechanism has been fully carried out (e.g., before the separate operation for each individual vertex is carried out). If this were so, then the visualiser’s reliance on their image may lead them to give responses sooner and less accurately than the aphantasic participants, who rely solely on the spatial mechanism, without any ‘distractions’.⁴⁹

In any case, the results derived from the experiments conducted on aphantasia and mental rotation tasks clearly show us that visual object imagery phenomenology is not necessary in order to solve the task successfully.

Mental Scanning

In Kosslyn’s first mental scanning experiment (Kosslyn, 1973), participants were asked to scan (i.e., shift their attention) over mental images of little drawings, such as the boat depicted in the upper half of Figure 2 below, which they had previously memorised. Kosslyn’s (1973) idea was that if it would take participants more time to scan over longer distances in their mental image, this would show that distance is an intrinsic part of the mental representation of the image, thereby proving that the underlying format of mental images is depictive.

Although the results of the study initially seemed to provide evidence for a depictive representation (participants indeed took more time to ‘scan’ longer distances in their mental images), Kosslyn (1981) reports that it was suggested

⁴⁸The situation is further complicated by a recent study conducted by Palermo et al. (2022), which reports that there might be aphantasia subtypes corresponding to the distinction between object and spatial imagery, and where the *spatial aphantasia* subtype is “associated with difficulties in visuo-spatial mental imagery” (Palermo et al., 2022, p. 1). This result stands in stark contrast to other studies (Bainbridge et al., 2020; Dawes et al., 2020), where aphantasics reported normal spatial imagery abilities. However, it should be noted that Palermo et al. (2022) did not investigate an aphantasic sample (as classified, e.g., by VVIQ cut-off scores) and showed reduced spatial imagery abilities within that sample, but instead *defined* spatial aphantasia as scoring low on the spatial items of the Object and Spatial Imagery Questionnaire (OSIQ). This approach therefore is once again (see footnote 47) indicative of considerable differences between how researchers classify aphantasia (subtypes).

⁴⁹There is also evidence suggesting that there is a role for both depictive and propositional elements in mental rotation (Dennis & Cocude, 1989). Furthermore, having access to the pictorial preliminary solution may also provide advantages (in some situations, the importance of speed may trump that of accuracy). Therefore, I do not want to go as far as to suggest that the mental image in visualisers is purely epiphenomenal, but instead want to call the *degree* of explanatory force attributed to the mental image for mental rotation tasks into question.

to him (not by Pylyshyn) that a propositional explanation could be formulated. He ultimately rejected this explanation via a subsequent scanning experiment (Kosslyn et al., 1978), which we will discuss below, but taking a look at the account is instructive, in order to get an idea of how location information from images *could* be represented in a propositional format. In the explanation suggested to Kosslyn, the drawing was represented as a propositional structure, as shown in the lower half of Figure 2 below, such that the relative locations of every part can be represented as a list of propositional strings, such as BOTTOM-OF(PROPELLER, MOTOR), TOP-FRONT-OF(CABIN, WIENDSHIELD, etc.). In this explanation, the larger amount of time needed to scan longer distances was explained due to the number of links participants had to traverse through in the propositional network (e.g., 3 links between motor and porthole taking shorter than 4 links between motor and anchor, etc.; see below).

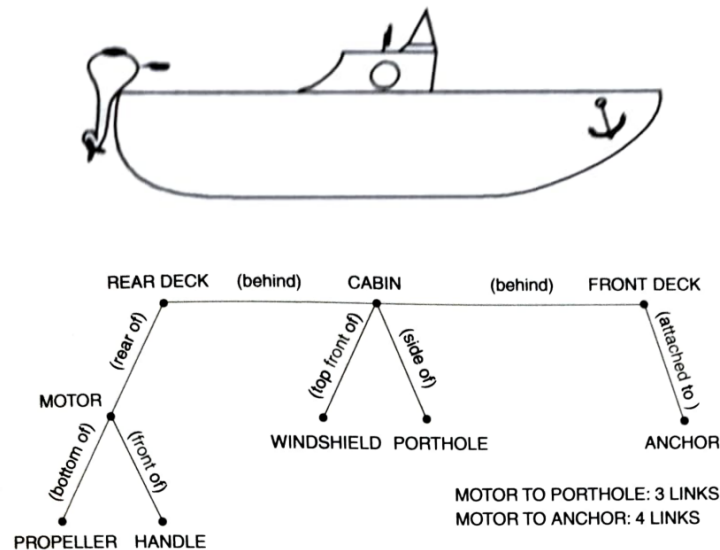


Figure 2: Top half: An image of a drawing used in Kosslyn's (1973) first mental scanning experiment. (From Kosslyn, S. M. [1973] Scanning visual images: Some structural implications. *Perception & Psychophysics*, 14 90-94.) Bottom half: A propositional structure representing the location information depicted in the image in the top half, by means of a propositional network with links (From Kosslyn, S. M. [1983]. *Ghosts in the mind's machine*. New York: Norton.)

In order to eliminate this alternative (propositional) explanation, Kosslyn designed a new experiment (Kosslyn et al., 1978), where participants were asked to memorise a map, such as the one depicted in Figure 3 below. What distinguished the objects on the map from the locations on the drawings in the

previous experiment (Kosslyn, 1973), was that the distance scanned across and the number of items to be scanned over were varied independently. Thus, if participants were merely transitioning through a number of links between each item in a propositional network, the actual metric distance should not play any role for their response times. However, in line with Kosslyn's prediction, the time needed to scan over the image increased linearly with increasing distance, even when the number of items to be scanned over remained constant.⁵⁰



Figure 3: The fictitious island map used in Kosslyn, Ball and Reiser's (1978) mental scanning experiment. Seven locations on the map are marked by a cross and the metric distances between location varies. Participants were asked to imagine a black dot flying from one location on the map to another. (From Kosslyn, S. M., Ball, T. M., & Reiser, B. J. [1978]. Visual images preserve metric spatial information: Evidence from studies of image scanning. *Journal of Experimental Psychology: Human Perception and Performance*, 4[1], 47-60.)

While the pictorialists interpreted the result that scanning time increases linearly with distance scanned across as evidence for mental images being represented by means of a depictive format (i.e., representing distances as distances), Pylyshyn (2002, 2003) argues that the result merely reflects the tacit knowledge

⁵⁰Note that the finding that the alternative propositional representation (see Figure 2) is ill-equipped to explain the scanning behavior in the map experiment must not worry us too much, since our goal here is not primarily to investigate how aphantasics represent distances (and even less to 'solve' the imagery debate), but rather to explore ways in which aphantasics might represent information contained in images in general. And for the purpose of representing general information from the picture, such as *where* the individual locations on the map are located in reference to one another, the alternative propositional account still works just fine.

that participants have of the distances between the locations. More generally, he (2002, p. 158) describes the *tacit knowledge claim* as the claim that “when subjects are asked to ‘imagine x,’ they use their knowledge of what ‘seeing x’ would be like”, in order to “simulate as many of these effects as they can”.

One way of investigating the contribution of tacit knowledge to imagery, Pylyshyn argues, is to apply the criterion of *cognitive penetrability* to the process in question. According to Pylyshyn (1981, 2002), a cognitive process is cognitively penetrable, if a change in beliefs or goals can alter the process, and cognitively impenetrable if it cannot. So, in the case of mental scanning, if not only the metric distances depicted on the map drawing itself, but also the participants’ beliefs about the distances (for example, when inaccurate distances would be suggested to them) would influence their scanning time, then this would be evidence for the process being cognitively penetrable.

However, although there is indeed evidence that expectations and task demands have an effect on mental scanning (Richman et al., 1979; Pylyshyn, 1981; but see also Jolicoeur and Kosslyn, 1985), the pictorialists reject the criterion of cognitive penetrability in general. According to them, the criterion cannot be used in order to show that there is no depictive representation, because the fact that knowledge and beliefs can influence imagery does not imply that *all* properties of imagery are due to one’s (tacit) knowledge (Kosslyn et al., 2002 in Pylyshyn, 2002). In a subsequent response to this criticism, Pylyshyn (2002, p. 223) insists that he does not merely claim that one can influence (the content of) one’s mental image to some extent, but that the image “has no properties other than those you take it to have.”⁵¹

Again, it is not of primary relevance for us to determine whether there is or is not a (partially) depictive format underlying mental images. Instead, we are trying to understand how relevant visual imagery phenomenology is for task performance in aphantasia, and are interested in possible ways in which depictive information can be represented non-pictorially. Unfortunately, there are currently no studies that investigate performance of aphantasic participants on mental scanning tasks, such as the one’s used by Kosslyn et al. (1978), meaning that we cannot rely on empirical results from the target population for our analysis. However, Pylyshyn suggests yet another way in which mental scanning can be explained without reference to depictive representations, which may offer us an interesting suggestion for how aphantasics *might* perform.

Pylyshyn (2002, 2003) suggests that participants in mental scanning experiments may use properties of the real environment (e.g., a wall in the room they are in), in order to anchor various objects in the imagined map.

You can think a thought which might be paraphrased as “the church

⁵¹Notice that Pylyshyn’s claim about the properties of mental images is reminiscent of Wittgenstein’s distinction between visualising and seeing (see section 2.2.2), where he argues that we do not act as observers with respect to our mental images, but instead actively *create* them. So, we cannot find anything in the image that we have not ‘put there’ ourselves (this is the reason why we cannot be surprised by our mental images). Pylyshyn (2002) also refers to Wittgenstein explicitly at a different point in his article, where he stresses that resemblance is neither necessary nor sufficient for meaning.

is located where *this* (speck) is on the wall, the beach is beside *that* (corner) ...” where each of the locative terms “this” and “that” picks out an object in the visual field and binds it to terms in the thought. Once the appropriate items are bound, “scanning the image” is accomplished by scanning between the selected items in the actual visual display. Thus, the increase in the time it takes to scan between items that are further on the imagined map is easily explained, since it involves scanning greater distances in the real scene (Pylyshyn, 2002, p. 168; emphasis in original)

Pylyshyn (2000, 2001, 2002) refers to the mechanism that anchors imagined objects in the real scene as *visual indexes*. Importantly, he stresses that his “vision-plus-indexes story” is not to be understood as proposing that an image is being superimposed over the real space, since it “assumes no pictorial properties of the ‘superimposed’ image, only the binding of imagined objects/locations to real perceived ones” (Pylyshyn, 2002, p. 169).

Considering that participants in mental scanning experiments are given a sufficient amount of time to study and memorize the map, we could expect that, when aphantasics are taught about the ‘visual indexes’ strategy, they would be able to generate propositional representations (e.g., a list of locative notes), which allow them to anchor at least some locations in the real space. We might even consider some possible adaptations to Pylyshyn’s strategy. For instance, the aphantasic could practice the scanning direction and duration from one location on the map to another during the memorisation phase of the experiment, by anchoring the first location (e.g., the beach) to a specific point on the wall and then actually performing an eye-movement that would ‘bring them’ to the second location (on the wall). If the aphantasic would follow this particular strategy, it could be argued that they are more likely to succeed on the task, since they have already practiced (at least some of) the relevant eye-movements, instead of having merely anchored the imagined objects in space.

Three remarks regarding (the implications of) this strategy are in order. Firstly, assume that somebody conducts a mental scanning experiment with aphantasic participants and, unbeknownst to the experimenter, the aphantasics all use the strategy outlined above. Now, assuming that this strategy would lead at least to some success (we must not postulate that aphantasics would perform as well as visualisers), this may seem to suggest to the experimenter that the aphantasics do use mental imagery to solve the task but that they are unconscious of it. While we will discuss the idea that aphantasics are merely *unaware* of their mental images in more detail below (see section 3.2.5), our thought experiment should show us how a specific type of behavior or performance (e.g., eye-movements) might be falsely interpreted as evidence for a specific theory, be it one concerning aphantasia, or the underlying format of mental images.

Secondly, one might object that, while we can imagine that aphantasics might use such a strategy, there is no reason to believe that they do so. This is of course correct, but the point is that there *could* be a strategy that might allow them to perform the task. And consider this: if I teach an aphantasic this

strategy, and she then exhibits the desired behavior in the experiment, could we say that she now knows how to play the *language game of mental scanning*? After all, she is able to respond in the way that is desired, and if she were to participate among visualisers, she might not even stick out. While at this point these are of course mere speculations, these considerations should open us up to the idea that we cannot make a prediction about an aphantasic's performance on imagery tasks, before considering some possible alternative ways of solving these tasks without having to rely on any (internal) pictorial representations.⁵²

Lastly, leaving the particular phenomenon of mental scanning behind, we can also suggest that mimicking eye-movements involved in imagery tasks should provide a helpful strategy for aphantasics in other tasks as well. For example, we could show an aphantasic and a normal visualiser the behavior of a bouncing ball that is being dropped from a specific height. Then, we could ask them to estimate the behavior of the ball, if it were dropped from a different height, or if the material were slightly more dense (i.e., less bouncy), by giving time estimates for time until first impact, height of bounce after first impact, second impact, etc. In order to accomplish this, it is entirely possible that both the visualiser and the aphantasic use their imagination, by ways of trying to trace the path that they would expect to be seeing, if the ball were dropped in such and such a way, with their eyes. And while the aphantasic, opposed to the visualiser, might not have any accompanying visual imagery phenomenology, they might still be able to trace the supposed path just as well, although they are just *acting as if they are visualising it*. This opens up an interesting suggestion. Perhaps, aphantasics can solve a certain range of imagery tasks, such the bouncy ball task, by simply imagining that (i.e., acting as if it were the case that) they can visualise. Thus, aphantasics might make use of a sort of *meta-imagination*. We will thoroughly discuss the idea of meta-imagination in the last chapter of the thesis. For now, we will turn to the neurological aspects of the picture theory.

3.2 The Neural Correlates of Mental Imagery

3.2.1 Kosslyn's Visual Buffer

As we have alluded to above, Kosslyn's (1996) quasi-pictorial theory of mental images postulates that mental images are spatial representations in the primary visual cortex. In order to fully understand this claim, think about the map that was being used in the mental scanning experiment (see section 3.1.2). There, the object that the participants' mental image was of, namely the actual (physical) map, depicted distances that were laid out, in cm, in real space. Kosslyn posits that these literal distances are represented in the mental image by means of literal distances (meaning also in cm) on the primary visual cortex.

⁵²We should also keep in mind that for the mental rotation task, for which we actually do have empirical data, we have seen that aphantasics are indeed able to perform accurately, even though the task was initially considered to rely on visual imagery. And although I have argued that for the mental rotation task, aphantasics might not even have to use a different strategy than visualisers, it should be noted that the consensus in the literature (Zeman et al., 2010; Crowder, 2018; Pounder et al., 2022) *is* that aphantasics use an alternative strategy.

Kosslyn’s claim that mental images use real, physical space on the cortex in order to represent distances on the objects imagined is inspired by an experiment by Tootell et al. (1982), where it was found that the primary visual cortex in monkeys represents simplistic perceived patterns by means of actual spatial representations in the visual cortex. In the experiment, Tootell and colleagues injected monkeys with a radioactive form of sugar and trained them to look at a pattern of blinking lights. After the animals were sacrificed, researchers were able to investigate their brains, where the radioactive substance indicated which brain cells were most active during the task (the more active the area was, the more sugar was taken up into the cell, leaving dark bands on the area). The pattern that was found in the monkey’s primary visual cortex (also referred to as V1 or area 17) after autopsy, is depicted in Figure 4 below.

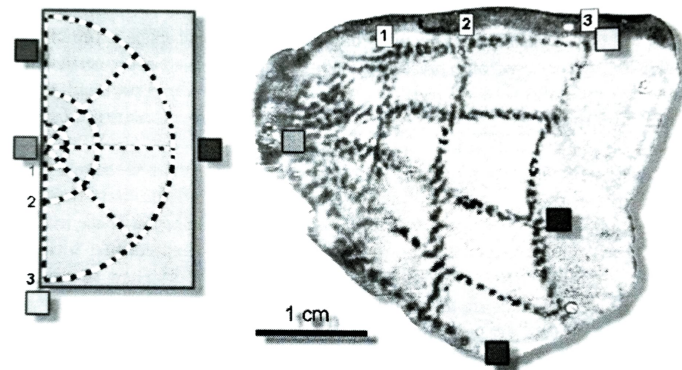


Figure 4: Results derived from Tootell et al.’s (1982) experiment, where monkeys were injected with radioactive sugar, in order to analyse which brain areas were most active during a perception task. The monkeys were trained to stare at a pattern of blinking lights (left). A pattern corresponding to the stimulus, shown as the dark bands, was found in the monkey’s primary visual cortex after autopsy (right). (From Kosslyn S. M., Thompson, W. L. & Ganis, G. [2006]. *The Case for Mental Imagery*. Oxford University Press.)

Kosslyn (1996) argues that Tootell et al.’s (1982) experiment shows that the primary visual cortex (in monkeys) is retinotopically mapped, i.e., that there exists a spatial mapping between points on the retina and the primary visual cortex.⁵³ This finding provides the neurological basis for his concept of the *visual buffer*, which is defined as the “single functional structure” that results when we group together “the topographically organized areas in the occipital lobe” (Kosslyn et al., 2006, p. 18). The full model (see Kosslyn et al., 2006,

⁵³However, according to Kosslyn, the neurons in these topographical areas do not merely register a single property, e.g., the presence or absence of light at the corresponding point on the retina, but code for a range of properties, such as orientation (of a line) and hue. Therefore, for Kosslyn, images on the primary cortex are *hybrid representations*, since the neurons which represent non-depictive information, are arranged in a spatial pattern.

Ch. 5) posits that, during perception, information received from the eyes and represented in the visual buffer, is sent to other brain areas, such as the inferior temporal lobe or the posterior parietal lobe (Kosslyn et al., 1998), where other subsystems then process the information, with the goal of matching it to a representation from long-term memory.⁵⁴

According to Kosslyn’s (1996) quasi-pictorial theory, mental images, just like the percepts during perception, are represented spatially in the visual buffer. Specifically, the theory posits that imagery occurs when a stored (part or characteristic of a) representation from long-term memory is “primed so strongly that activation is propagated backwards, inducing a representation of [the relevant] part or characteristic in the visual buffer” (Kosslyn et al., 2006, p. 144). So, while perception is a bottom-up process, starting in the visual buffer and then being processed in later visual areas, imagination works in a top-down manner, by priming a non-depictive representation, in the same later brain regions, which is then reconstructed in the visual buffer as a depictive representation.⁵⁵ Therefore, Kosslyn concludes, “the visual buffer, in essence, is the canvas upon which images are painted; it is the medium that supports depictive representations” (Kosslyn et al., 2006, p. 18).

Kosslyn’s theory that mental imagery and perception use a shared neural substrate, crucially involving the early visual cortex as an area where visual imagery is represented, overlaps extensively with the current dominant model of visual mental imagery, Pearson’s (2019) *reverse hierarchy model*. Just as in Kosslyn’s quasi-pictorial theory, the reverse hierarchy model posits that perception and imagination use a common neural substrate and that imagination uses this substrate in reverse direction (top-down) from perception (bottom-up). Furthermore, also in line with Kosslyn, the model posits that in the case of mental image generation, the process is initiated in the frontal cortex and then propagated backwards to more posterior brain regions, where information from memories is recruited in order to provide the sensory and spatial representational content of the intended imagery. Lastly, Pearson’s description of the role of the early visual cortex for imagery phenomenology in the model is reminiscent of Kosslyn’s description of the visual buffer as “the canvas upon which images are painted” (Kosslyn et al., 2006, p. 18).

The visual cortex is something akin to a ‘representational blackboard’ that can form representations from either the bottom-up or top-down inputs. The degree of ongoing noise in this representational blackboard will impact imagery, and so too will the strength

⁵⁴Kosslyn notes that the (visual) memories that are being accessed in order to find a match for the representation in the visual buffer, which are presumably stored in the inferior temporal lobe, are themselves not stored topographically. Therefore, he states, these representations, unlike the representations in the visual buffer, cannot be considered to depict the information.

⁵⁵Kosslyn’s model distinguishes between spatial images and depictive images, thus reflecting the distinction between spatial and object imagery discussed above (see section 3.1.2). Interestingly, he states that spatial imagery does not rely on the reconstruction of a representation in the visual buffer (only depictive images do). Therefore, if mental rotation tasks really solely rely on spatial imagery, one might wonder why they are accompanied by object imagery phenomenology at all, since Kosslyn’s theory posits that the visual buffer is not involved.

of the top-down signal (analogous to the strength or contrast of ‘chalk’ in this blackboard metaphor). (Pearson, 2019, p. 628)

In light of the extensive overlap between Kosslyn’s and Pearson’s respective theories, we can view Pearson’s reverse hierarchy model as a continuation of Kosslyn’s quasi-pictorial theory.⁵⁶ Although Pearson does not mention Kosslyn’s concept of the visual buffer explicitly, it is evident, e.g., in the quote above, that he attributed a similar role and importance to the primary visual cortex. Therefore, it is not surprising that, as we will see now as we move on to discuss criticism leveled against the reverse hierarchy model, the same arguments used against Pearson’s model were also used to call Kosslyn’s theory into question.

3.2.2 The Role of the Primary Visual Cortex in Mental Imagery

The role of the primary visual cortex in mental imagery is the topic of a current debate in cognitive neuroscience, with one side arguing that imagination, neurologically speaking, is merely inverse perception (Dijkstra et al., 2020; Pearson, 2020) and the other side claiming that the early visual cortex plays no causal role in visual mental imagery (Bartolomeo et al., 2020; Spagna et al., 2021).

The side of the debate which claims a crucial involvement of the primary visual cortex in mental imagery uses Pearson’s (2019) reverse hierarchy model. According to the model, two factors influence the strength of mental imagery, namely 1) the noise signal in the visual cortex and 2) the strength of the top-down signal. Accordingly, weak or absent imagery is caused either by high noise in the visual cortex, or by a weak top-down signal, likely due to a disruption in the ventral stream, which is involved in the processing of object characteristics during perception (Pearson, 2019).⁵⁷ The interaction of noise and top-down signal proposed by the reverse hierarchy model is depicted in Figure 5 below.

The idea that imagination and perception both make use of the primary visual cortex in order to represent visual content seems to be supported by decoding studies (Albers et al., 2013; Naselaris et al., 2015), where machine learning algorithms that were trained on neural activity in the primary visual cortex during perception were subsequently able to decode the content of corresponding visual mental images.⁵⁸ Horikawa and Kamitani (2017) even showed that deep learning algorithms trained on perception can be used to decode untrained characteristics of mental imagery, and Koenig-Robert and Pearson (2019) report that decoding neural activity in the primary visual cortex can be

⁵⁶This passing of the torch is probably best exemplified by a joint paper by Pearson and Kosslyn (2015), where they proclaim the ‘end of the imagery debate’ (in favor of pictorialism, obviously). We will consider some of the evidence that led them to this proclamation below.

⁵⁷While the ventral stream processes object properties, the dorsal stream, which leads from the primary visual cortex into the parietal lobe, processes spatial information. Thus, the possibility of ventral stream damage in the absence of damage to the dorsal stream (and vice versa) allows for a dissociation between object and spatial imagery, providing a neurological explanation for the intact spatial imagery abilities reported by aphantasics (see section 3.1.2).

⁵⁸These findings have led some (Pearson & Kosslyn, 2015; MacKisack et al., 2016) to suggest that depictive representations are being used during visualisation, thus resolving the imagery debate in favor of the pictorialists.

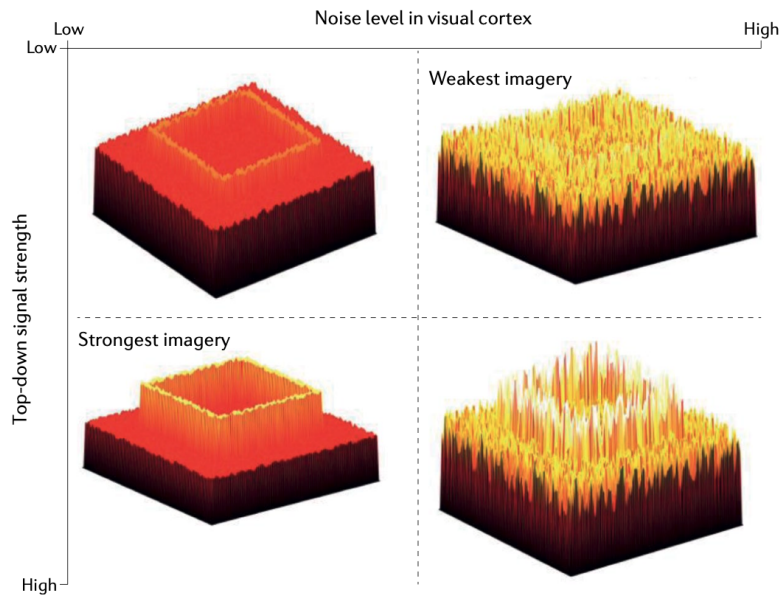


Figure 5: Representation of the interaction of noise in the visual cortex and top-down signal strength for the visual imagery phenomenology of a cube, according to the reverse hierarchy model of mental imagery. The weakest imagery (top-right) results from high levels of noise in combination with low signal strength. (From Pearson J. [2019]. *The human imagination: the cognitive neuroscience of visual mental imagery. Nature Reviews. Neuroscience, 20(10), 624–634.*)

used to predict which of two images participants will choose to imagine, as well as the vividness of their imagery. Taken together, these results show, at the very least, that during mental imagery formation, neural activation correlated with the content of the image occurs in the primary visual cortex, and this activation appears to be comparable to that found during perception of external stimuli.

However, the reverse hierarchy model has been sharply criticised by Bartolomeo et al. (2020; see also Spagna et al., 2021), who argue that evidence from brain damaged patients shows that the primary visual cortex plays no causal role for mental imagery phenomenology. One of the examples discussed by Bartolomeo et al. (2020) is the case study of PB (Zago et al., 2010), a 83 year old man, who suffered damage to both calcarine cortices, resulting in a complete destruction of his primary visual cortex. Although PB was cortically blind, he showed no deficiencies in a range of standard imagery tests, compared with eight matched controls, leading Zago et al. (2010, p. 47) to conclude that their findings “do not support the hypothesis that the brain’s early visual cortices are critically involved in the process of visual mental imagery.” This finding falls in line with a previous study (Chatterjee & Southwood, 1995), where researchers investigated three patients with cortical blindness and found that two of them

(both with extensive damage to their primary visual cortex) succeeded on various imagery tasks, with one of them even displaying “exquisitely preserved visual imagery abilities” (p. 2193).

While both Pearson’s (2019) reverse hierarchy model and Kosslyn’s (1994) quasi-pictorial theory postulate a shared underlying neural substrate of perception and imagination, Bartolomeo (2002, 2008) argues for a double dissociation between imagination and perception, by reviewing evidence suggesting that intact imagery can occur in spite of absent perceptual abilities (as e.g., in Chatterjee & Southwood, 1995) and vice versa. His review of brain damaged patients ultimately leads Bartolomeo to reject Kosslyn’s concept of the visual buffer and Spagna et al. (2021), supplementing Bartolomeo’s claims with evidence from neuroimaging studies (Fulford et al., 2018; Thorudottir et al., 2020), reject Pearson’s (2019) reverse hierarchy model on similar grounds.

The double dissociation between perceptual and imagery abilities, with highly consistent lesional correlates, provides strong evidence against the claim that visual mental images are, as it were, [displayed] on a visual buffer consisting of topographically organized areas in the occipital lobe. (Bartolomeo, 2008, p. 108)

The present evidence, together with the extensive evidence from brain-damaged patients with intact [visual mental imagery] after lesion restricted to the occipital cortex (Bartolomeo, 2002; Bartolomeo et al, 2020), strongly suggests that [visual mental imagery] does not need activity in early visual areas. (Spagna et al., 2021, p. 213)

In their respective responses to the criticism, both Kosslyn and Pearson argue that one should not overestimate the effect of brain damage in the early visual cortex on imagery formation, with Kosslyn (Kosslyn et al., 2006, p. 165) stating that such damage merely results in imagery of “relatively low resolution” and Pearson (2020, p. 518) likewise arguing that imagery would only lose its “high-fidelity precise dimensions”.⁵⁹ In light of the metaphors that both researchers previously used to describe the role of the primary visual cortex, referring to it as “canvas” (Kosslyn) and “blackboard” (Pearson) respectively, this appears to be a substantial concession on their part. For if the primary visual cortex indeed were the blackboard upon which the top-down signal (the chalk) was represented, we would expect that the presence of a functioning primary visual cortex is a *necessary* condition for the experience of visual mental imagery, since, to stick with the blackboard metaphor, the strongest chalk (top-down signal) is useless without a blackboard to use it on.

⁵⁹The cautious reader will have noticed that the quotes from Bartolomeo and Spagna et al. are dated 2008 and 2021 respectively, thus rightfully wondering how quotes from 2006 (in the case of Kosslyn et al.) and 2020 (in the case of Pearson) could possibly be replies to these later quotes. This confusion can be easily dissolved. In fact, Kosslyn et al. (2006) reacted to Bartolomeo (2002), instead of Bartolomeo (2008) and Pearson (2020) reacted to Bartolomeo et al. (2020), instead of Spagna et al. (2021). However, as Bartolomeo (2008) and Spagna et al. (2021), in my estimation, provided the more succinct quotes, I have taken the liberty to pick these later iterations of their criticisms in order to outline their position.

One may object to this line of reasoning by stating that we should not overemphasise the importance of the metaphors used by Pearson and Kosslyn. After all, it might be argued, these are *just* metaphors. However, this objection misses the crucial point that Pearson and Kosslyn use the metaphors in order to provide an intuitive understanding of the complex neural processes. Thus, if their theory ascribes a role similar to that of a canvas or blackboard to the primary visual cortex, this shows that they attribute a certain importance to the neural processes in the primary visual cortex (since a blackboard/canvas is essential in order to write/paint something on one). So, when they are then down-playing the importance of the primary visual cortex in order to mitigate criticism, my showing that their mitigation leads their own metaphors ad absurdum is a way to show that they cannot have their cake and eat it too, meaning that *either* imagery experience in spite of a destroyed primary visual cortex is possible, *or* the primary visual cortex is comparable to a blackboard/canvas (but not both).⁶⁰ Furthermore, in the context of the imagery debate, if one can experience quasi-pictorial imagery in the absence of retinotopically mapped cortex, this calls the explanatory force attributed to the retinotopicity experiments, including the decoding studies, for pictorialism into question.⁶¹

With respect to the evidence from the decoding studies discussed above, Spagna et al. (2021, p. 212) argue that these findings are correlational in nature and that they might “reflect nonfunctional byproducts, instead of the true neural bases of [visual mental imagery]” (this argument seems reminiscent of Pylyshyn’s [2002] attack on Kosslyn’s retinotopicity argument). Brain damage studies, on the other hand, they argue, demonstrate “a causal contribution of the lesioned circuits to the relevant cognitive abilities (Bartolomeo et al., 2020, p. 517). Therefore, in order to formulate a revision of Pearson’s reverse hierarchy model, instead of investigating which neural regions are correlated with intact imagery, Spagna et al. (2021) focus on cases where patients have lost imagery as a consequence of brain injury (what Zeman [2020] refers to as cases of acquired aphantasia of the neurogenic type), in order to determine what neural circuitry may play a necessary role for imagery phenomenology.

3.2.3 The Neural Correlates of Aphantasia

Acquired Aphantasia

The first documented case of a sudden loss of visual mental imagery (i.e., acquired aphantasia) reaches back as far as 1883 to Charcot and Bernard’s patient M.X (not to be confused with Zeman et al.’s [2010] patient MX). Since the only

⁶⁰Another way to see this is to revisit Figure 5 and to ask oneself what would happen, according to this depiction, if the agent would not have a primary visual cortex. And the only possible answer seems to be that there would be no imagery experience at all, since the square in the depiction, in line with the canvas metaphor, is represented *on* the visual cortex.

⁶¹Another line of defense mounted by Pearson is that the brain damage studies are methodologically flawed, due to their reliance on subjective reports and the use of questionable assessment tools. We will revisit this argument later as a part of our discussion of meta-imagination.

perceptual impairment diagnosed in M.X was a minor reading disorder, it is also the first documented case of intact perception in combination with absent imagery (Bartolomeo, 2002, 2008). Later cases of visual imagery loss were summarized and reviewed by Farah (1984), who used an early pre-neurological version of Kosslyn’s visual buffer theory (see footnote 46) in order to account for their findings. While Charcot and Bernard (1883) proposed no suggestions or speculations with respect to the possible lesion location in M.X, Farah (1984, p. 268) concludes that the findings of her review of 37 cases provide “inductive evidence that if a patient has lost the ability to generate images then he or she will have left posterior damage.”⁶²

Another review of isolated deficits of mental imagery is the aforementioned review conducted by Bartolomeo (2002; but see also Trojano and Grossi, 1994), who reviewed cases published after Farah’s (1984) review and criticised her use of the visual buffer theory in her explanation of the imagery deficits (see section 3.2.1). In his conclusion, Bartolomeo (2002, p. 373) states that while “occipital damage can determine perceptual deficits,” it appears to be “neither necessary nor sufficient to produce imagery deficits.” Instead, he argues, the evidence suggests that damage to the temporal lobe is necessary to produce imagery deficits. Furthermore, he argues that his review does not only show that perception and imagery are doubly dissociable but also that “dissociations can occur even between different imagery domains,” including such domains as “colors, letters, and faces” (Bartolomeo, 2002, p. 373).

Bartolomeo’s remark regarding domain-specific imagery deficits provides an important caveat for our investigation, since the taxonomy of aphantasia only distinguishes cases based on whether aphantasia is congenital or acquired and whether the acquired cases are neurogenic or psychogenic, but not between types of imagery *content*.⁶³ In fact, if we understand aphantasia as the (complete) absence of visual mental imagery (Zeman, 2020), cases where patients can visualise *everything except* colors or faces simply do not qualify. An inability to visualise faces, for example, seems more likely to be linked to prosopagnosia, i.e., the inability to recognize faces, which is usually absent in aphantasia (see Milton et al., 2021).⁶⁴ Therefore, although Bartolomeo’s (2002) finding that

⁶²Farah’s finding that imagery deficits appeared to be associated with damage to the left hemisphere was striking at the time, since imagery was widely assumed to be associated with the right hemisphere (Ehrlichman & Barrett, 1983). Interestingly, Farah (1984, p. 268) also points out that her findings suggest that the right hemisphere seems to be involved with “various forms of ‘spatial abilities’ and higher visual perceptual processing,” thus foreshadowing the later distinction made between object and spatial imagery.

⁶³As I have mentioned above (see footnote 48), Palermo et al. (2022) suggest to introduce a distinction between object and spatial aphantasia subtypes. However, notice that the domain dissociations reported by Bartolomeo (e.g., faces, colors, letters) all fall into the object imagery category, meaning that an object-spatial distinction is too coarse-grained to account for them.

⁶⁴Milton et al. (2021) suggest to distinguish between sub-types of aphantasics with and without prosopagnosia. Interestingly, while prosopagnosia is not isolated to mental imagery (prosopagnosics also fail to recognize perceived faces), Grüter et al. (2009), who used the VVIQ in order to investigate the mental imagery abilities of a prosopagnosic group, report to have found “the lowest mental imagery scores ever published for a non-brain damaged group” (p. 135) Their finding thus provides preliminary evidence that while aphantasics are usually

damage to the temporal lobe seems to be consistently associated with all types of domain-specific imagery deficits provides us with an interesting pointer, we will now focus on one of the few cases that clearly qualify as aphantasia.

Thorudottir et al. (2020) report the case of a 52 year old architect, PL518, who lost his ability to form visual mental imagery as a consequence of a bilateral posterior cerebral artery (PCA) stroke. The researchers compared the neuropsychological data from PL518 with four other patients that suffered a PCA stroke (one of which was also an architect) and report that although there was a substantial overlap with respect to the cognitive deficits between the patients, PL518 was the only one that experienced aphantasia. When comparing the damaged areas, they found that the only areas that were selectively lesioned in PL518 were in the right lingual gyrus and the left medial posterior fusiform gyrus. Since there exists at least one reported case (Bogousslavsky et al., 1987) of bilateral damage to the lingual gyrus without accompanying deficits in color, face and place imagery, the authors conclude that the damage to the medial fusiform gyrus specifically seems to be associated with PL518's aphantasia.⁶⁵

In line with Thorudottir et al.'s (2020) finding, Spagna et al. (2021, p. 214), in their proposed revision of Person's (2019) reverse hierarchy model (see section 3.2.1-2), suggest that the fusiform region might function as "an interface between semantic processing in the anterior temporal lobe" and "perceptual information coming from the occipital cortex". According to their model, aphantasia may thus occur when this "interface" in the left fusiform gyrus, which they refer to as the *Fusiform Imagery Node*, is functionally disconnected from the medial temporal network, which functions as "a neural substrate for recombining elements of past experiences to generate episodic simulation in [visual mental imagery]" (Spagna et al., 2021, p. 215).

An additional piece of evidence for the theory that aphantasia may crucially involve abnormalities in a specific area of the fusiform gyrus comes from the case of MX (Zeman et al., 2010), who, despite showing normal activation in the fusiform gyrus when viewing faces, showed a hypoactivation of the area when attempting to visualise them. While the authors interpret the hypoactivation of the fusiform gyrus during the visualisation task as related to the content of the task (they mention that the area includes the fusiform *face* area), this hypoactivation may indeed account for *all* of MX's imagery deficits. In fact, the finding that MX was able to identify faces when viewing them and that the fusiform gyrus was activated normally during the face perception task, should suggest to us that his fusiform face area is intact and that the cause for his imagery deficit is located elsewhere (perhaps in the Fusiform Imagery Node).

In conclusion, the evidence from studies investigating imagery loss as a consequence of brain damage shows that while damage to areas in the temporal lobe can, depending on the exact location, selectively impair domain-specific

not prosopagnosic, prosopagnosics might be aphantasic; but see Tree and Wilkie (2010) for evidence suggesting a category-specific imagery impairment in prosopagnosia.

⁶⁵Interestingly, the authors state that there is some evidence (Dobel et al., 2008; Gerlach, 2017) for abnormalities in the left fusiform gyrus in prosopagnosics. This might lend additional support to the hypothesis that prosopagnosics are aphantasic (see footnote 64 above).

imagery, damage to the specific area in the left fusiform gyrus that was lesioned in PL518 may induce complete visual imagery loss, by means of preventing *any* visual imagery-related information flow between temporal and occipital lobe.

Congenital Aphantasia

The only systematic brain imagining study comparing aphantasics with non-aphantasics to date was conducted by Milton et al. (2021), who compared the brain activation of 24 aphantasics, 25 hyperphantasics and 20 normal visualisers during rest, as well as during a perception and imagery task.

With respect to the resting state fMRI, aphantasics showed reduced connectivity between a range of areas in the prefrontal cortex, as well as the visual-occipital network, compared with the hyperphantasic and normal visualiser groups. The authors state that this finding may support Pearson’s (2019) reverse hierarchy model, by showing that top-down signals in the neural substrate during imagery generation place stronger demands on the network than during perception. Surprisingly, for the task-based fMRI, where participants were instructed to visualise a face or a place out of a selection of faces and places that were previously presented to them, the authors report that they did not find any significant differences in activation between aphantasic and hyperphantasic groups, when comparing brain activation during visualisation and perception. Furthermore, a volumetric MRI showed no significant differences between any of the groups with respect to the volume of any brain region.

Fulford et al. (2018), instead of investigating self-identified congenital aphantasics, administered the VVIQ to a sample of 111 students, of which they selected the 14 highest and 15 lowest scorers for a subsequent fMRI task involving the perception and visualisation of faces and buildings. The authors report that during the visualisation task the low vividness group showed stronger activation in a number of widely distributed cortical regions, compared with the high vividness group. Since some of these regions (e.g., the superior and temporal gyri) are associated with semantic memory and the processing of abstract concepts (Ralph et al., 2017), this may suggest that aphantasics make use of semantic rather than episodic memory when trying to recall visual features.

At the current moment, the experimental data concerning the neural correlates of congenital aphantasia are insufficient to allow for a conclusion. However, the available evidence points towards an absence of significant structural differences in brain regions in aphantasics, when compared with normal visualisers, and suggests that aphantasics may use alternative strategies in order to solve imagery tasks.

3.2.4 Aphantasia and Memory

While aphantasics do not show any neurological abnormalities, some studies suggest that the inability to form visual images negatively impacts episodic (Dawes et al., 2020, 2022) and autobiographical memory (Zeman et al., 2020). Here, we will review these findings, next to some other findings (Jacobs et al.,

2018; Keogh et al., 2021) which suggest that aphantasics show no deficiencies in their visual working memory abilities.

Episodic and Autobiographical Memory

Episodic memory is the memory of our everyday personal experience and consists of “temporally dated episodes or events, and the temporal-spatial relations” among them (Tulving, 1972, p. 385). Episodic memory is distinct from *semantic memory*, which is our memory of facts (e.g., cats usually have four legs and a tail, Paris is in France, etc.), but connected with *autobiographical memory*, which consists of memories of one’s personal history (Roediger & Marsh, 2003) and therefore includes both episodic (e.g., how it felt when I stepped on that sea urchin) and semantic memory (e.g., the fact that I went to Greece last year).

In a study comparing the online self-reports of aphantasics and controls on a variety of cognitive abilities (Dawes et al., 2020), aphantasics reported remembering significantly less personal life events, as assessed by the *Survey of Autobiographical Memory* (SAM; Palombo et al., 2013).⁶⁶ In a later study (Dawes et al., 2022), the authors argue that these self-report measures are confirmed by the finding that aphantasics, compared with controls, produce significantly fewer episodic details, both when recalling past memories and constructing future events, as assessed via the *Autobiographical Interview* (AI, Addis et al., 2008). The observed connection between a deficiency in episodic memory recall and the construction of future scenarios falls in line with the finding that patients with hippocampal amnesia (i.e., memory deficits following hippocampal damage) have difficulties imagining new scenarios (Hassabis et al., 2007).

However, the lack in episodic detail in the scenarios described by the aphantasic participants in Dawes et al.’s (2022) study was isolated to the visual modality. For context, the AI assesses episodic details on the categories event, time, place, thought, emotion and perceptual detail, and the ‘perceptual detail’ category has subcategories for each sensory modality (Addis et al., 2008). The episodic memory detail of aphantasics’ scenario descriptions was shown to be deficient only with respect to the subcategory ‘visual details’, meaning that aphantasics neither showed deficient abilities with respect to the other perceptual subcategories, nor to any of the other major episodic categories, for both past and future scenarios. Thus, the aphantasics’ imaginative abilities differ drastically from those of Hassabis et al.’s (2007) patients, whose imagined future scenarios were fragmentary and lacked coherence. Furthermore, while the deficiency in the visual modality in the descriptions of aphantasics was large enough to lead to a significant between-group effect with respect to total episodic detail, it should be remarked that, far from being incapable of (re)constructing past and future events, the aphantasics’ descriptions only contained an average of 10.6% less episodic detail than those of controls.

⁶⁶The same study also showed that aphantasics score lower than controls on a custom designed test for episodic memory, the *Episodic Memory Imagery Questionnaire* (EMIQ). However, since items on the EMIQ were “partially derived from the VVIQ” (Dawes et al., 2020, p. 3), one might argue that it is not surprising that aphantasics, who are expected to score low on the VVIQ, also score low on a test that is partially modeled on the VVIQ.

With respect to autobiographical memory, it has been suggested that aphantasia might be linked to autobiographical memory deficiencies (Zeman et al., 2020), and it was even argued (Watkins, 2018) that this takes the form of a severe impact, linking aphantasia to another recently coined condition, namely *Severely Deficient Autobiographical Memory* (SDAM, Palombo et al., 2015).

Since aphantasia appears to be linked to deficient visual episodic memory, and since autobiographical memory partly consists of episodic memory, we can expect, on theoretical grounds, that the deficiencies in episodic memory contribute to a deficiency in autobiographical memory, specifically with respect to the visual modality. However, there is no reason to assume that autobiographical memory would be impacted in any other way, since there are no theoretical grounds to expect the semantic memory of aphantasics to be impacted,⁶⁷ meaning that the impact of aphantasia on autobiographical memory likely is reducible to that on their episodic memory. Furthermore, the suggested link between aphantasia and SDAM (Watkins, 2018) has not been empirically assessed.

Therefore, while there is a detectable difference between the episodic detail in aphantasics and normal visualisers with respect to the visual modality, this neither means that aphantasics are unable to (re)construct past and future events, nor that the constructed scenarios are incoherent, and there is no theoretical or experimental evidence suggesting that factors other than episodic memory would lead to a deficiency in the autobiographical memory of aphantasics.

Visual Working Memory

We have seen that the episodic/autobiographical memory in aphantasics is affected with respect to the visual modality. This may suggest that aphantasics cannot remember visual details in general, meaning that they also have deficient visual short-term (i.e., working) memory. This assumption appears to gain further traction from the suggestion that visual imagery and visual working memory tasks might be measuring the same cognitive function (Tong, 2013).

Keogh et al. (2021) compared the performance of aphantasics and normal visualisers on a range of working memory tasks, including visual and non-visual (i.e., number) working memory capacity, as well as spatial visual working memory and visual working memory accuracy. The researchers report finding no significant differences between both groups for either visual or non-visual working memory capacity, as well as for spatial visual working memory. With respect to the working memory accuracy task, aphantasics even scored significantly higher than controls, which the authors, by means of a follow-up task, show to be at least partially due to them not experiencing an oblique effect, i.e., an increased difficulty to recall the position of images when they are displayed at an oblique

⁶⁷Since semantic memory is grounded in knowledge about facts (e.g., Paris is located in France, a cat has four legs, etc.), assuming that aphantasics would have deficient semantic memory would amount to attributing to them an epistemic disadvantage, compared to visualisers. However, as I will argue below (see section 4.2.1), the idea that aphantasics are at such an epistemic disadvantage is an instance of what I will call the visualiser's fallacy.

rather than a cardinal angle.⁶⁸ Lastly, the authors assessed both groups on the *WAIS-IV Working Memory Index* (WMI) and found that aphantasics performed equally well as controls with respect to both visual and auditory working memory. The authors conclude that not only does visual imagery not appear to be necessary for visual working memory tasks but also that “using a non-visual imagery strategy to remember visual information, can result in better performance” (Keogh et al., 2021, p. 249).

However, while Keogh et al.’s (2021) results suggest that aphantasics are not at a disadvantage with respect to visual working memory, Jacobs et al. (2018) report that in their study of an aphantasic woman, they found that she performed significantly worse than controls on the highest difficulty of a visual working memory task (while performing as competently as controls on all other difficulties), thus suggesting that visual imagery might still provide an advantage with respect to high-precision visual working memory.

Lastly, another interesting study in the context of aphantasia and working memory was conducted by Bainbridge et al. (2021), who asked both aphantasics and controls to draw three pictures that they have previously been shown. The authors report that aphantasics drew fewer objects, colored their objects less and spent less time drawing each object than controls. However, they positioned objects at the correct locations and drew them at the right size, thus suggesting intact spatial memory.⁶⁹ Lastly, aphantasics were found to use more verbal labels in their drawings and to make less mistakes than controls. The authors conclude, in line with Keogh et al. (2021), that while visual imagery may represent a possible strategy, “there may be other, non-visual strategies to complete the task” (Bainbridge et al., 2021, p. 170).

While I will present and discuss the results of my own preliminary investigation into the reported strategies of aphantasics on an everyday visual working memory task (finding the right screwdriver to drive in a screw) below (see section 4.2.2), we can already conclude here that, based on the available empirical evidence, aphantasics do not seem to have deficient visual working memory, with the possible exception being high-precision visual working memory tasks.

3.2.5 Is Aphantasia Merely Unconscious Imagery?

In order to investigate whether congenital aphantasics may be merely unconscious of their visual imagery, Keogh and Pearson (2018) conducted an experiment where they tested the performance of 15 congenital aphantasics on a binocular rivalry task. In the experiment the aphantasics were cued to visualise either a red horizontal or a green vertical color patch and were then presented

⁶⁸The oblique effect states that the visual system is better equipped to perceive cardinal (i.e., 0, 90, 180, 270, or 360 degrees) rather than oblique (i.e., non-cardinal) angles (Berkley et al., 1975; Takács et al., 2013). This effect has also been demonstrated in the context of visual working memory (Taylor & Bays, 2018).

⁶⁹This distinction between object and spatial memory appears to be reminiscent of the distinction between object and spatial imagery, which was proposed to account for the successful performance of aphantasics on mental rotation tasks (see section 3.1.2).

with a display where each patch was independently presented to each eye, after which they were asked to indicate which color they perceived (see Figure 6).

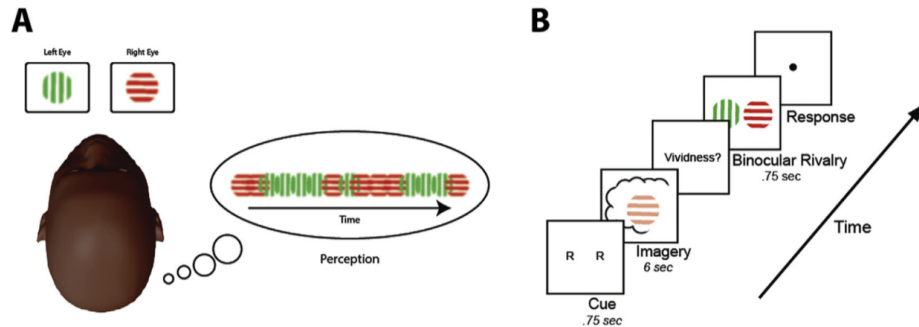


Figure 6: Illustration of the binocular rivalry task (A) and the experimental timeline (B). When two images are presented to each eye independently, perception alternates between the two, instead of mixing them. When non-aphantasics are cued to visualise one of the colors, this color tends to be dominant in their perception of the following rivalry task. (From Keogh, R. & Pearson, J. [2018] *The blind mind: No sensory visual imagery in aphantasia. Cortex, 105*, 53-60.)

Aphantasics did not only show significantly lower priming effects compared to a general population sample, but their scores were not even significantly different from chance, leading Keogh and Pearson (2018, p. 58) to conclude that “congenital aphantasia is characterised by a lack of low-level sensory visual imagery, and is not due to a lack of metacognition or an inability to introspect.”

Nanay (2021b) remarks that it might still be possible that aphantasics possess *involuntary* unconscious imagery, since the task only assessed voluntary imagery. However, since it was also found that aphantasics have a reduced galvanic skin response, compared to controls, when confronted with visually evocative frightening narratives (Wicken et al., 2021), this suggests, contrary to Nanay (2021b), that they also do not have involuntary unconscious imagery.

In conclusion, due to the evidence that aphantasics neither show behavioral signs of voluntary (Keogh & Pearson, 2018) nor involuntary (Wicken et al., 2021) unconscious visual mental imagery, we can safely assume that the absence of imagery phenomenology in aphantasia is not caused by a deficit in metacognition and that aphantasia is already measurable at the sensory/bodily level.

3.3 Discussion of the Neuroscientific Approach

The neuroscientific approach can, undoubtedly, contribute to our understanding and theoretical considerations of psychological phenomena, including those of mental imagery and aphantasia. However, as our discussion of the imagery debate, as well as the debate surrounding the role of the primary visual cortex for imagery and the available literature on the neural correlates of acquired

and congenital aphantasia has shown, there are some limitations and potential pitfalls when relying too heavily on a neuroscientific approach to mental imagery.

With respect to the imagery debate and the retinotopicity results (see section 3.2.1), we have seen that finding that certain cortical areas are activated in such and such a way (e.g., showing a pattern of activation in line with a perceived/imagined stimulus), does not yet tell us anything about the *causal* role of that activation. Even more so, it can lead one to employ strongly suggestive metaphors when describing the role of these brain areas, such as when Kosslyn refers to the visual buffer as a “canvas”, or when Pearson compares the primary visual cortex with a “blackboard”. Furthermore, while we might expect that using the newest technology or the most sophisticated methods to assess and analyse neurological data should necessarily grant us more certainty with respect to our theories, the opposite may be the case. The possibility to train the newest deep learning algorithms on data derived from top-notch fMRI scans, for example, may provide many advantages over using, say, Blood Oxygenation Level Dependent (BOLD)⁷⁰ signals, but it does not necessarily prevent one from *mistaking correlation for causation*. Instead, it could even be argued that the more precise the instruments and measurements are, the more likely it may be that someone using them thinks that their interpretation is *obvious*, thus encouraging false or under-determined theories.

Another limitation of the neuroscientific approach is its reliance on a rather unnatural experimental setting (Stam, 2021; Stam et al., 2022). As Stam (2021) points out, neuroscientific experiments, due to their investigation of single subjects in conditions where they are isolated from their natural surroundings and only have very restricted possibilities of movement (e.g., inside of an fMRI scanner) suffer from an *individuality bias*. These limitations weigh especially heavy if we take the Wittgensteinian perspective that our language-games are played within a community. And while laying still inside an fMRI scanner and trying to visualise a picture of a building that was previously displayed on a small display may also be a language-game involving an act of visualisation, with its own goals and rules, it seems far off from the context in which acts of visualisation occur in the everyday interaction between people in their natural surroundings, thus limiting the generalisability of results derived in this very specific setting.

Are congenital aphantasics neurologically impaired?

When considering congenital aphantasics, we might question whether using the word ‘impairment’ is an accurate description of their situation, since they neither show any apparent neural abnormalities, nor seem to be impaired on tasks that were expected to require the use of visual imagery, such as the mental rotation task (see section 3.1.2). And although Thorudottir et al.’s (2020) finding of the selectively impaired area in PL518’s fusiform gyrus may provide a very promising suggestion for how aphantasia can be *acquired*, it does not follow (and has also

⁷⁰Blood Oxygenation Level Dependent (BOLD) signals record the changes in hemoglobin-oxygenation, which give an indication of the local metabolic activity that occurs as a result of increased neural activity. This provides a non-invasive method of determining neural activity.

so far not been suggested by the limited data) that this specific area plays a causal or any kind of other role in *congenital* aphantasia.

Considering brain plasticity, one may rightfully wonder why, since the excessive use of specific brain areas can lead to a significant enlargement of these regions, as, e.g., the hippocampus in London taxi drivers (Maguire et al., 2000), aphantasics, who supposedly employ special alternative strategies to perform tasks that are ‘normally’ solved by means of visual imagery, do not show any differences in the volume of any brain area, compared to normal visualisers. One possible answer might be that our ‘normal’ cognitive architecture is already well-equipped to accommodate the ‘alternative strategies’ used by aphantasics. Another possible answer might be that there are no volumetric changes in aphantasics, because there are *so few* tasks that really require visual imagery that there is insufficient frequency of situations that necessitate alternative strategies, since there is no visual default strategy to begin with.⁷¹ In any case, both of these possibilities suggest that aphantasics are not significantly impaired.

In conclusion, the findings from the neuroscientific investigation of aphantasia might suggest a parallel with Zeman et al. (2010) initial reaction to the cognitive and behavioral capacities of MX. While Zeman and colleagues were surprised that MX was not significantly impaired with respect to his cognitive abilities, the neuroscientist might have been surprised to not find any abnormalities (in volume or other) in the aphantasic brain (although, arguably, Zeman et al.’s [2010] finding should have suggested exactly *that*). Thus, perhaps against one’s initial expectations, the neuroscientific approach, instead of showing us why aphantasics are *different* from non-aphantasics, has instead shown us how *similar* aphantasics are to their ‘normal’ visualising peers.

Interim Conclusion

In this part of the thesis, I have presented and discussed two debates involving mental imagery, namely the imagery debate and the debate regarding the role of the primary visual cortex in mental imagery and have reviewed the experimental findings concerning the neural correlates of acquired and congenital aphantasia.

I have argued that neither should one use neural correlates in order to propose concrete functional or causal roles of brain regions for mental imagery or aphantasia, nor should one assume that evidence collected from studies on acquired aphantasics is directly transferable to the congenital type. With respect to congenital aphantasia, I have further argued that, based on the current available evidence, one should not view the condition as a neurological impairment, since aphantasia seems to be neither connected with apparent structural neural abnormalities, nor with significantly impaired cognitive abilities, even with respect to tasks that seemingly involve the use of visual mental imagery.

Lastly, I have argued that the neuroscientific approach to mental imagery is limited with respect to the restrictive and unnatural setting which it imposes.

⁷¹Liesefeld and Zimmer’s (2013) finding that even normal visualisers, despite their accompanying object imagery phenomenology, seem to use exclusively spatial imagery information to solve mental rotation tasks (see section 3.1.2) may be a good example of this general idea.

4 Imaginability as Representability

Structure of Chapter 4

In this last major chapter, we will cash in on our previous investigations into what I have called the phenomenological and the neuroscientific approach to mental imagery, by using our insights in order to develop a new theoretical concept, *meta-imagination*, and investigating its implications for both the condition of aphantasia and our understanding of the term ‘visual mental imagery’ in general.

In subchapter 4.1, we will define the concept of meta-imagination, by drawing on both Wittgensteinian and Pylyshynian arguments and concepts (4.1.1). Furthermore, we will discuss what I refer to as the language-game of visualising, and show that aphantasics, despite their inability to visualise, are able to play this language-game, by means of meta-imagining (4.1.2). Lastly, I will propose a distinction between what I will refer to as *type* and *token imagery* and I will argue that while aphantasics do not have direct access to the token level of imagery, they can still access it indirectly, through the type level of imagery, to which they have direct access.

In subchapter 4.2, I will discuss what I will refer to as the *visualiser’s fallacy*, namely the assumption that because a visualiser has accompanying object imagery during a task, object imagery phenomenology is necessary in order to solve the task. However, I will argue that a range of supposed visual imagery tasks can be solved by means of (tacit) knowledge (4.2.1). Then, I will discuss the results derived from a question about an everyday task that seemingly requires mental imagery, namely finding the correct screwdriver to drive in a screw, which I have posed to a group of congenital aphantasics, and I will distill three strategies that subjects have reported to be using in order to solve this type of task (4.2.2). Lastly, I will propose the *Wittgensteinian twist* that aphantasics are able to form visual mental images, and argue that we might have to rethink our interpretation of the term ‘visual mental imagery’ (4.2.3).

4.1 Meta-Imagination: Theory

4.1.1 Coining Meta-Imagination

The goal of this section is to show that aphantasics, even though they are not able to form any visual mental imagery, are nonetheless able to participate in what I will call the *language-game of visualising*, by using a mental technique, which I will call *meta-imagination*. However, before we can define the concept of meta-imagination and discuss its relation to the language-games of visualising and seeing, we must first lay some (technical) groundwork.

To start things off, we must ask ourselves what an *imaginative episode*, including but not limited to an act of visualisation, consists of. While there are clearly cases of involuntary imaginative episodes, such as drifting off in one's thoughts (i.e., daydreaming), or intrusions that can occur in the course of Post-Traumatic Stress Disorder (PTSD), we will for now focus only on *voluntary imaginative episodes*. I propose the following definition:

A **voluntary imaginative episode (VIE)** is a volitional mental activity whereby an agent A represents a possible state of affairs S to themselves.

Examples of VIEs include imagining that I am a pirate while engaging into pretend play with my niece, imagining seeing a beach as part of an exercise in a relaxation course, or imagining that there is a detective with questionable morals roaming the streets of Vienna while writing a noir novel. However, daydreaming, unless done as a volitional act, e.g., to alleviate boredom, does not qualify as a VIE but rather as a form of non-maladaptive intrusive thought (opposed to the maladaptive intrusive thought we encounter in PTSD).

A VIE can be accompanied by a visual mental image, for example when my VIE about being a pirate involves forming a visual mental image of a pirate ship in the distance, or when Ellie visualises David's face while imagining that he is thinking about her. However, a successful VIE does not necessarily have to be accompanied by any visual mental imagery. For example, if I were to engage into pretend play with my niece, the success criteria of my VIE would be to convince *her* that I am imagining to be a pirate, and what is necessary in order to do so is for me to *act as if* I were a pirate, for example by hobbling on my 'wooden leg' or by frightfully shouting "Captain, there is Blackbeard's ship!" while pointing at a truck that is driving down the street.

Here, the goal of convincing my niece that I am imagining seeing 'Blackbeard's ship' while pointing at the truck, say, can be achieved by utilizing Pylyshyn's (2001, 2002) *visual indexes account* (see section 3.1.2), by generating the mental note 'The truck is Blackbeard's ship.' and then acting accordingly (e.g., instead of saying "The truck is driving towards us.", I would say "The ship is sailing towards us.", etc.). Thus, the mental note 'The truck is Blackbeard's ship.' can alleviate the need to actually conjure up a visual mental image of a ship in the location where the truck is.⁷² In fact, forming a visual mental image

⁷²Alternatively, instead of using another visible object in the real world, such as the truck,

of a ship in the location of a truck is itself a mental indexing of the truck as a ship, only *accompanied* by a visual mental image.

Similarly, while a VIE can be accompanied by or expressed via verbal and non-verbal actions, such as my ‘warning’ my niece of ‘Blackbeard’s ship’ (verbal) or my hobbling on my ‘wooden leg’ (non-verbal), a VIE is not necessarily accompanied by such actions either. I could, for example, simply with the goal of amusing myself, imagine that I am a pirate during dinner with my family without expressing my VIE in any way (i.e., I could simply sit there and think to myself “I am a pirate.”). This VIE might be accompanied by some visual imagery, such as forming the visual image of a parrot on the shoulder of my father but, again, visualisation is not necessary (i.e., I could just think to myself “There is a parrot sitting on my father’s shoulder.”, without any accompanying imagery). Thus, we see that VIEs can not only occur with or without accompanying visual mental imagery but also with or without accompanying actions. Based on the two factors ‘accompanying visual image’ and ‘accompanying action’, we can now distinguish between (at least) two types of imagination.

Imagination₁ refers to the performance of observable acts corresponding to (the content of) a voluntary imaginative episode (e.g., hobbling on a ‘wooden leg’ while imagining being a pirate). *Imagining₁* is to be read as ‘to act as if’.

Imagination₂ refers to the act of generating a visual mental image corresponding to (the content of) a voluntary imaginative episode (e.g., generating the visual mental image of a pirate ship while imagining being a pirate). *Imagining₂* is to be read as ‘to visualise’.⁷³

Following the distinction between *imagination₁* and *imagination₂*, we can now define a *meta-imaginative act* as follows:

A **meta-imaginative act** occurs when an agent *A* *imagines₁* that they are *imagining₂*, i.e., when they are acting as if they are visualising, without actually visualising anything.

In order to understand the specific application of the concept of meta-imagination, we will now cross the two factors ‘accompanying visual image’ (yes/no) and ‘accompanying action’ (yes/no), in order to derive four different types of VIEs.

for the indexing, we can just as well pick a random location where we want to imagine the ‘ship’ to be (this location could even be out of sight, such as when I say “Captain, I just got word that the ship arrived in Rotterdam.”) and then *decide* on the ‘ships’ behavior (e.g., whether it is coming towards us or not, etc.) Again, no visual image of the ship is needed.

⁷³*Imagination₂* could also be broadened to capture all possible modalities of perception-like imagining, such as generating an auditory mental representation (an imagined sound) or an olfactory mental representation (an imagined smell), etc. Since the focus of this thesis is on the inability to form visual mental imagery specifically, my current definition of *imagination₂* only captures the visual modality. Nonetheless, I hold it for possible that the arguments that I will make for (visual) aphantasia below could also be adjusted to make them applicable to cases of aphantasia in other modalities (e.g., auditory aphantasia, etc.).

- (VIE₁) VIE without image and without action (e.g., simply thinking to oneself “I have a wooden leg.”)
- (VIE₂) VIE with image but without action (e.g., thinking to oneself “I have a wooden leg.” plus forming a visual image of one’s ‘wooden leg’)
- (VIE₃) VIE without image but with action (e.g., thinking to oneself “I have a wooden leg.” plus hobbling on one’s ‘wooden leg’)
- (VIE₄) VIE with image and with action (e.g., thinking to oneself “I have a wooden leg.” plus forming a visual image of one’s ‘wooden leg’ and hobbling).

The first thing that we notice is that, since a meta-imaginative act involves observable action (imagining₁), we can exclude cases VIE₁ and VIE₂, because they occur without action. Next, we notice that meta-imagination cannot occur in the case of VIE₄, since a meta-imaginative act only involves the agent acting as if (imagining₁) they are visualising (imagining₂), instead of them actually visualising anything. Thus, meta-imagination, by definition, cannot occur in VIE₁, VIE₂ and VIE₄. However, this does not mean that all instances of VIE₃ are cases of meta-imagination either. For example, if I act as if I had a wooden leg by hobbling about without forming any visual image, I am not necessarily acting as if I am visualising anything, I am merely acting as if I had a wooden leg. But if I were now to say to my niece “Captain, look at my wooden leg, it’s all rotten and mossy and it has seaweed all over” while *not* forming a visual image of a rotten, mossy, seaweed-drenched wooden leg (either at the location of my actual leg or simply ‘in my head’), *then* I would engage into a meta-imaginative act, since I would act *as if I were visualising* my ‘wooden leg’. We can thus conclude that only in VIE₃ and only if the content of my imagining₁ (i.e., my acting as if) is essentially *visual* can I be said to engage into a meta-imaginative act (at least according to what I have defined as a meta-imaginative act above).

4.1.2 The Language-Game of Meta-Imagination

Next, in order to understand how one could act as if one were visualising, we must ask ourselves what the *behavioral correlate* of visualising consists of, or, in more Wittgensteinian terms, what the *language-game of visualising* consists of.

However, it is important to note that my use of the term ‘language game’ does not capture the full concept of a Wittgensteinian language game. For recall that there is not one language-game of visualising, seeing, etc., but a multitude of practices that involve the use of the respective terms, each with their own set of rules, success criteria, goals, characteristic behaviors, etc. (think, for example, about the difference between the ‘police sketch’ type and the ‘art therapy’ type, discussed above [see section 2.2.3]). So, while I will provide ‘definitions’ of language games, these should, at most, be seen as general descriptions of basic expected behaviors in the context of a whole range of different (sub-)types of everyday language-games involving the terms in question. For example, my definition of the language-game of visualising, which I will give below, while

capturing a common element of both the ‘police sketch’ and the ‘art therapy’ type, does not do full justice to either type, as it glosses over all of the important details, such as the specific rules, goals, etc., that distinguish these different types of language-games. Nonetheless, while my use of the term ‘language game’ is not fully Wittgensteinian, I take it, due to its aim being the elucidation of expectations regarding characteristic behaviors that arise in the context of the intersubjective use of a term (e.g., ‘to visualise’), to be at least Wittgenstein-ish.

Let us now, while holding this cautionary remark in mind, attempt to delineate what I will call the language-game of visualising, by first considering the group that is arguably the best at visualising, namely hyperphantasics.

Recall that hyperphantasia is defined as “the experience of visual imagery as vivid as real seeing” (Zeman, 2020, p. 700). So, if a hyperphantasic would form a visual image of X (e.g., an apple) then the experiential visual content of their image of X, at least with respect to the level of vivacity, should be indistinguishable from the experiential visual content of actually *seeing* X. Thus, if a hyperphantasic would form an image of an unoccluded apple and they are asked “Does the apple have any ‘visible’ red elements on the side that you are visualising it from?”, then we would expect that they *have to* respond either with “Yes” or “No”. For if the hyperphantasic’s visual mental image is as vivid as real seeing, and if we consider that seeing an unoccluded apple gives us information about its color (at least on the side we are seeing it from), then visualising an apple has to give them information about its color as well.⁷⁴ More generally, for hyperphantasics, the visual experiential content of a visual mental image of X (where X can be any theoretically observable object or state of affairs), is parasitic on the visual experiential content that seeing an X *would evoke*.

If we take the hyperphantasic’s visual imagery as the gold-standard for visual imagery in general (I will consider some arguments against this below) then we can define the (Wittgenstein-ish) language-game of visualisation as follows:

The **language-game of visualising X** (where X can be any theoretically observable object or possible state of affairs) consists of an agent A (re)acting in such a way as if they were seeing X.

So, if any agent (not necessarily only a hyperphantasic one) receives the order “Visualise X!”, this should prompt them to engage into a VIE, as part of which they form a representation of the possible state of seeing X, i.e., they should consider which visual experiential content seeing X would invoke. Now,

⁷⁴One might want to object that there might be a scenario where the hyperphantasic replies “I do not know, I am visualising it in black and white”. However, I would argue that this answer should be interpreted as equivalent to “No”, since, if the visual mental image is black and white, then there are no ‘visible’ red elements. The hyperphantasic might imagine that the black-and-white apple is ‘really’ red, but this red is not contained in their *visual* image, since they are not visualising the red (the information about the ‘true’ color of the apple may be attached *to* the image of the apple in the form of a mental note stating “This is a red apple viewed in black-and-white.”). Similarly, if I were to use a software that can detect the color code of pixels, the software would not find any red pixels in a black-and-white photo taken of a red apple. And notice that I am not asking the hyperphantasic whether the imagined apple *is* red but merely whether there are any ‘visible’ red elements in their *visual* mental image.

in order to understand what (re)acting as if one were seeing X means concretely, let us consider what the *language-game of seeing X* (in our sense of the term, i.e., as an elucidation of a set of general expected behaviors connected with the use of ‘I see X’ in an intersubjective setting) consists of.

The **language-game of seeing X** (where X is an observable object or state of affairs) consists of an agent A being able to report information about the visible qualities (e.g., size, form, color, etc.) of X.

For example, if I am seeing a ball laying on the ground in front of me, then I can gather information on its color, size and other visual qualities, such as whether it looks dirty or not, etc. So, if I would tell somebody, for example on a telephone call, that I am seeing a ball laying on the ground in front of me right now and the other person would ask me which color or size the ball has, then, if I would reply “I do not know.”, they would be right to doubt whether I am actually seeing a ball laying in front of me right now. Thus, we see that there is a parallel between the expectations connected with the capacity of seeing in a sighted agent and the expectations connected with the capacity of visualisation in a hyperphantasic agent, namely that we can expect the sighted agent to report on what they are seeing and the hyperphantasic agent on what they are visualising. And this is, of course, no coincidence because the expectations towards the hyperphantasic agent come exactly *from* the fact that their visual mental imagery is said to be indistinguishable from sight in its vivacity.

Thus, *for any type of visible quality Q (e.g., form, color, etc.) that a sighted person could report upon seeing X (where X is an observable object or state of affairs), a hyperphantasic person can be expected to report Q with respect to their visual mental image of X (we might call this the hyperphantasia theorem).* For hyperphantasic visual imagery is as vivid as real seeing and vivacity determines the amount of information that can be reported about the visible details of X. Thus, if a hyperphantasic forms an image of X, then, since their imagery is as vivid as real seeing and since the visible details of X provide information about the visible qualities of X, their image of X should contain information about all of the visible qualities that could be gathered from seeing X.

Having considered the case of hyperphantasia, let us now investigate what general behavioral expectations the use of the term ‘to visualise’ implies if uttered by a ‘normal’ visualiser, i.e., an agent that is neither hyper- nor aphantasic.

While hyperphantasics should be able to report exactly the same visual qualities of their visual image of X that sighted agents would be able to report if they were seeing X, normal visualisers, who’s visual imagery is not ‘as clear as real seeing’, are subject to different expectations. For if a normal visualiser were only able to form a vague or blurry visual mental image of an apple, say, we cannot expect them to report on minute details that would be visible if they were seeing an apple in front of them. However, we can define a *minimal expectation* that would be entailed by them stating that they are visualising X, namely that *they must be able to produce some report on the visual experiential content*

of their image of X.⁷⁵ This is so because the language-game of visualising X consists of an agent A re(acting) in such a way as if they were seeing X and the language-game of seeing X consists of A being able to report information about the visible qualities of X. Therefore, if an agent is not capable of reporting *any* visible qualities that would be accessible to them if they were seeing X, then they cannot be said to be playing the language-game of visualising X correctly.

After having laid all of this groundwork, we are finally in a position from which we can consider the *language-game of meta-imagining X* (in our sense of the term). Recall that a meta-imaginative act occurs when an agent *imagines*₁ that they are *imagining*₂, i.e., when they are acting as if they are visualising.

The **language-game of meta-imagining X** (where X can be any theoretically observable object or possible state of affairs) consists of an agent A (re)acting in such a way as if they were visualising X.

The first thing that we notice here is that the language-game of meta-imagining X differs from the language-game of visualising X only in the fact that while in the latter the agent (re)acts as if they were *seeing* X, in the former the agent (re)acts as if they were *visualising* X. Thus, the relationship between the language-game of meta-imagining X and that of visualising X is the same as that between the language-game of visualising X and that of seeing X. Based on this realisation, we can order the three language-games hierarchically as follows:

- (1) The language-game of seeing X consists of being able to report on the visible qualities of X.
- (2) The language-game of visualising X consists of (re)acting as if one were seeing X.
- (3) The language-game of meta-imagining X consists of (re)acting as if one were visualising X.

However, there is an important detail that is not obvious in this hierarchy and that we need to pay very close attention to, namely that ‘visualising X’ in (3) does not refer to the ‘language-game of visualising X’ in (2) but instead to the ‘visualising’ from *imagination*₂. Let me explain. Recall again the difference between *VIE*₃ and *VIE*₄ (see section 4.1.1):

- (*VIE*₃) *VIE* without image but with action (e.g., thinking to oneself “I have a wooden leg.” plus hobbling on one’s ‘wooden leg’)
- (*VIE*₄) *VIE* with image and with action (e.g., thinking to oneself “I have a wooden leg.” plus forming a visual image of one’s wooden leg and hobbling).

⁷⁵Note here that this report of the visual experiential content of X can also take forms such as “X is blurry.”, or “It is as if I were seeing X through a wall of fog.”, etc., meaning that reports on the partial visible indeterminacy of X still qualify as reports on the visual experiential content that A has of X. Only when being unable to give *any* report on the visual experiential content whatsoever, would the agent not be considered to be visualising X.

Now, let us restrict both types of VIEs in such a way that they only refer to visual content that is reported on. And note that I will here use an example of a verbal report, the report can also occur in non-verbal form (e.g., if I were to point at the ‘ship’ and widen my eyes dramatically, or if I would make a drawing of the imaginary ship together with my niece, etc.).

- (VIE₃*) VIE with visual content without image but with report (e.g., shouting “Captain, I see Blackbeard’s burning ship at the horizon!” without forming a visual image of Blackbeard’s burning ship)
- (VIE₄*) VIE with visual content with image and with report (e.g., shouting “Captain, I see Blackbeard’s burning ship at the horizon!” while forming a visual image of Blackbeard’s burning ship).

There are two things that are crucial to notice here. Firstly, only an agent engaged in a VIE of the type VIE₄* could be said to be using imagination₂. For imagination₂ is defined as the act of generating a visual mental image corresponding to (the content of) a voluntary imaginative episode and an agent engaged in VIE₃* is *not* forming any visual mental image. Secondly, no matter whether an agent would engage in a VIE of the type VIE₃* or VIE₄*, *in both cases the agent can be said to be playing the language-game of visualising X correctly* (in our sense of the term ‘language-game’). For we defined the language-game of visualising X as the agent (re)acting in such a way as if they were seeing X and in both VIE₃* and VIE₄* the agent *is* (re)acting as if they are seeing X, since they are *reporting* on the (imagined) visible qualities of X (e.g., reporting ‘seeing’ that Blackbeard’s ship is on fire). Therefore, while imagination₂ necessarily requires the agent to actually visualise (VIE₄* only), i.e., to actually generate a quasi-perceptual visual experiential content ‘inside their head’, so to speak, the language-game of visualising X only requires the agent to act as if they are seeing X, thus covering both VIE₃* and VIE₄*.

So, we can conclude that *when an agent A plays the language-game of visualising X (where X can be any theoretically observable object or possible state of affairs), it is not necessary that A is actually forming a visual mental image of X, i.e., that A makes use of imagination₂, in the process* (we might refer to this as the *visualisation theorem*). This is so because an agent who engages in a VIE of type VIE₃* is playing the language-game of visualising X, since they are acting as if they were seeing X, and a VIE of type VIE₃* does not involve the agent forming a visual mental image of X, meaning that they are not making use of imagination₂. Therefore, forming a visual mental image of X, i.e., using imagination₂, is not necessary for an agent in order to be playing the language-game of visualising X.

At this point, we can revisit the language-game of meta-imagining X and realise that, from the perspective of an agent A, who is observing the (non)verbal report of the VIE of another agent B (e.g., B telling A that they ‘see’ Blackbeard’s ship, or A looking at B’s drawing of their imagined ship, etc.), A would not be able to tell whether B is visualising X or meta-imagining X. Of course, if A would be allowed to conduct experiments on B, such as giving B a binocular

rivalry task (see section 3.2.5) or assessing the neural correlate of B's VIE, then A might indeed be able to tell whether B is engaging in a VIE of type VIE_3^* or VIE_4^* , i.e., whether B is merely acting as if they are forming a mental image of X (VIE_3^*) or really doing so (VIE_4^*). However, if A is supposed to tell whether B is visualising or meta-imagining X *solely based on B's (non)verbal report of their VIE*, then A will not be able to tell, since in both cases B, viewed from A's perspective, will be *acting as if they are seeing X*, since they are representing visual information on X. Thus, there is no observable behavioral difference between the reports of a VIE involving visual content given by an aphantasic and a normal visualiser, or even between that given by an aphantasic and a hyperphantasic, with respect to everyday VIEs, such as imagining seeing a ship, etc. For the aphantasic can simply use meta-imagination, i.e., act as if they are visualising, literally making the visual details of their VIE up, which will be perceived from the other person (the observer/listener) in the same way as if the aphantasic were describing an actual visual mental image.⁷⁶

It may seem as if this result, viewed from a Wittgensteinian perspective, would imply that visualisation and meta-imagination are really just the same concept, since “an inner process stands in need of outward criteria” (PI §580), meaning that if other people cannot distinguish between the behavior of a visualising and a meta-imagining agent, then we could not distinguish the inner processes of aphantasics from those of visualisers either. And this would be a puzzling conclusion, since it seems obviously false to say that visualising and meta-imagining a ball, say, are the same thing, not just due to the fact that the observable neural correlate of aphantasics during visual imagery tasks, as we have seen above (see section 3.2.3), differs from that of visualisers, but also because Wittgenstein tells us that visualising behavior with visualisation and visualising behavior without visualisation are not the same thing (cf. PI §304).

However, upon closer inspection, we see that it is not the case that the behavioral correlate of visualisers and aphantasics during their respective VIE reports is always identical. For a difference becomes observable exactly when they are asked directly whether they are *literally* having a quasi-perceptual experience or not. It is this point where the Eureka moment, experienced by many congenital aphantasics, of realising that other (non-aphantasic) people are not merely using the terminology adopted from the visual modality in order to speak about ‘seeing’ this or that *metaphorically* but that they are actually having an experience akin to seeing, originates from. Or, put in a different way, congenital aphantasics *learn* that they are aphantasic at the very moment where they are pressed on the question of whether they are having a quasi-perceptual experience in the course of their imagining or not. It is the answer to *this* question where visualisers and aphantasics diverge behaviorally, meaning that there is indeed a distinguishing outward criterion that stands in connection with the inner pro-

⁷⁶Notice that we could also not necessarily use the reaction time of the agents in order to decide whether they are visualising X or meta-imagining X, since it might be the case that some aphantasics are extremely quick-witted and thus able to produce made-up visual details instantly, while some hyperphantasics might take a bit longer to report on their visual image. More generally, the reporting speed of a VIE is not necessarily bound to the VIE type.

cesses associated with the imaginings of visualisers and aphantasics respectively, meaning that the conclusion that, viewed from a Wittgensteinian perspective, visualising and meta-imagining are the same concept does not follow.

However, and this is the crucial point, many congenital aphantasics, as is evident from the responses reported on by Zeman (2020), are not confronted with this very specific question about their imaginings for many decades of their life (and some likely even go through their whole life without ever being confronted with it), meaning that until this decisive question is posed explicitly, they simply assume, based on their own experience, that everyone uses terms such as ‘seeing’ metaphorically when talking about their imaginings. But, importantly, as Wittgenstein shows us, they do not *learn* the meaning of the term ‘visualisation’ or ‘mental image’, etc., by means of reference to their private experience of imagining but by means of observing others engage into practices in which these terms are used. For example, they might, in their childhood, observe that when the order “Visualise an apple!” is given, other children and adults act as if they were seeing an apple, i.e., that they are *describing* an apple that they do not actually see. Thus, the congenitally aphantasic child might assume that the language-game of visualising an apple is played by naming (a list of) visual details that a specific apple could have, i.e., they learn, quite correctly, that visualising an apple means acting as if one were seeing an apple, although they do not (at least initially) learn anything about the fact that visualisers also have a quasi-perceptual experience corresponding to their description.

Notice now that if the aphantasic child were to comply to the rules, e.g., if it would manage to produce the same kind of answers as children who are actually visualising an apple would, then, since they would not be corrected by other members of their community, they would grow up thinking that they can visualise. And although they cannot visualise, *they can indeed play the language-game of visualising*, for recall that the language-game of visualisation, unlike imagination₂, does not require actual acts of visualisation but merely actions that suggest that one is seeing what they are imagining (this is the *visualisation theorem* that we have proved above). Therefore, we can conclude that *even though aphantasics cannot actually form a visual mental image of X (where X can be any theoretically observable object or state of affairs), they can still play the language-game of visualising X, by using meta-imagination, i.e., by acting as if they are visualising X* (we might call this the *aphantasia theorem*).

4.1.3 Token Imagery and Type Imagery

After having shown that aphantasics can successfully play the language-game of visualising (see section 4.1.2), I will now take a slightly different (and somewhat less technical) route towards explaining the workings of meta-imagination, by first invoking the popular *type-token distinction* (Peirce, 1906) and then defining what I will refer to as *token imagery* and *type imagery* respectively.

The type-token distinction is a staple of contemporary (analytic) philosophy and was introduced in 1906 by the American philosopher C. S. Peirce. Roughly summarized, a *type* is a class of objects, an abstract concept (e.g., the concept

‘cat’), and a *token* is a concrete instantiation of a class (e.g., my friend’s cat Lulu). Let us now consider what I will call *type* and *token imagery*.

Whenever we are seeing anything, whatever we are seeing is a token, since only tokens (but not types) exist in the material world and we can only see that which exists in the material world (essentially, the material world *consists of tokens*).⁷⁷ But how about mental imagery? Can we draw a type-token distinction when it comes to mental imagery, or is every mental image a token?

In some sense, every mental image is indeed a token, since it exists, i.e., it is occurring at a specific point in time t and has a specific neural correlate N (even though we cannot find the content of the VIE in the brain, or we might not be able to delineate which parts of the brain are causally involved in the VIE and which are not; see section 3.3). For example, my VIE about seeing a pirate ship (no matter whether by using imagination₁ or imagination₂) might occur on the 19th of February 2023 at 10:22 am and my brain at this particular time will be in a specific (global) state that could be recorded with an fMRI scan. However, if we detach the *content* of the VIE from its context in time (the specific moment t at which the VIE occurs) and space (the neural correlate N), I propose that we *can* make a type-token distinction with respect to mental imagery. Specifically, I propose that while aphantasic imagery (content) can be understood as type imagery, hyperphantasic imagery (content) should be viewed as token imagery.

Hyperphantasia as Token Imagery

Recall that for any type of visible quality Q (e.g., form, color, etc.) that a sighted person could report upon seeing X (where X is an observable object or state of affairs), a hyperphantasic person can be expected to report Q with respect to their visual mental image of X (this is the *hyperphantasia theorem*). This means, in turn, that for any X that a hyperphantasic visualises, there is a possible X' that could actually be, if it would exist in the real world. For example, for any set of ‘visible’ details Q that make up any apple that a hyperphantasic could visualise, there is a corresponding possible apple which could exist that shares all details Q with the imagined apple and which could actually be seen. But since everything that could be seen must be a token, the content of any visual mental image of any hyperphantasic *corresponds* to that of a possible material token. Therefore, the mental imagery of a hyperphantasic person can be understood as *token imagery*, i.e., as a form of imagery that generates token-like content.

⁷⁷One might want to object that we can also see things that are not part of the material world, such as hallucinatory objects, digital objects, or thoughts. But this is mistaken. Firstly, I cannot see a hallucinatory object, I can only hallucinate seeing an object (see section 2.2.2). Secondly, when we say that we are seeing digital objects, the only thing that we can mean is that we see a material correlate (e.g., an image made of pixels on a computer screen) of the digital object (and there can also be no digital objects that are not grounded in the material world, e.g., as states of computer chips on which they are run [c.f. Chalmers, 2022]). Thirdly, the only way how we could ‘see thoughts’ would be by means of either inferring thoughts from behavior, but then the behavior that we observe is itself physical, or by using neuroimaging, which would a) only show us a neural (hence physical/material) correlate of a thought (see section 3.3) and b) the image showing the scanning result is itself a material token.

Another path that leads us to the result that the content of hyperphantasic imagery is token-like is to realise that the details in a hyperphantasic’s mental image have to be *fixed*. The hyperphantasic can, of course, change the details of their mental image at will, e.g., changing the color of their imagined apple, but the details are nonetheless fixed in the way that they are fixed relative to any specific moment in time t .⁷⁸ So, if a hyperphantasic forms an image of a cat, say, then details, such as the color of its fur or whether it is facing them, etc., must be fixed, relative to any moment in time, to the same degree as they are fixed if someone sees a cat (from the same angle). In this sense, the hyperphantasic is imagining a *specific* imaginary cat, i.e., an *imaginary token cat*.

Lastly, consider that Kosslyn (Kosslyn et al., 2006, p. 14) states that depictive representations “cannot be abstract in any sense” and that they refer to “picturable entities” or “exemplars” (opposed to propositional representations, which can be abstract and can refer to non-picturable entities). While Kosslyn is talking here about the format of mental imagery rather than its content, I propose that what he is saying about depictive representations can be applied to the content of hyperphantasic imagery (and *only* to hyperphantasic imagery). Specifically, I argue that since the experience which the hyperphantasic has of his imagery is quasi-pictorial (or quasi-perceptual), it cannot be abstract in any sense and is of pictureable entities, and instead of calling these entities “exemplars”, as Kosslyn does, I use the term “tokens” to refer to them.⁷⁹

Aphantasia as Type Imagery

Recall that the defining feature of aphantasia is that aphantasics are not able to visualise, i.e., to form any visual mental imagery. So, an aphantasic, unlike a hyperphantasic, would not be able to generate anything even remotely close to a vivid visual image of an imaginary token. Thus, since the imagination of aphantasics is not generating token-like content, they cannot be considered to have token imagery (in the sense in which I have delineated the concept above). Instead, I will propose that aphantasics can and should be understood as possessing what I will refer to as *type imagery*, i.e., imagery that creates type-like content. In order to understand what ‘type-like content’ refers to concretely, let us first ask ourselves what ‘imagining X’ means to an aphantasic, i.e., which phenomenal experience is connected with their respective VIE of X.

One possible answer to the question of what an aphantasic’s VIEs are like would be to suggest that aphantasics are simply unable to experience any form of VIE with visual content. However, as I have shown above (see section 4.1.2), the use of meta-imagination enables aphantasics to perform VIEs of type VIE_3^* , i.e., VIEs with visual content and report but without image, so we can reject

⁷⁸Notice that I am not arguing that the hyperphantasic’s image is a token because the VIE occurs at a specific point in time (since we have abstracted away from the context of the VIE as situated in time and space) but that I am instead arguing that if we were to imagine the content of a VIE as shifting along an axis of time, that at any point where we would ‘look’ at it, its visual details would be fixed (compare to pausing a movie, leading to a ‘frozen’ image).

⁷⁹Notice that it is still possible, although in no way necessary for my theory, that the underlying format of the depictive content in hyperphantasic imagery is propositional.

the idea that they cannot engage into any VIEs with visual content. And this result should not surprise us, since if we give an aphantasic the order “Imagine X!”, she will not simply throw her arms up and tell us that she cannot. In fact, as Zeman (2020) reports, thousands of congenital aphantasics who only noticed their inability to form visual mental images after learning about the condition through his publications have lived their whole life until that point without even questioning whether they can or cannot form mental images. Thus, even though aphantasics do not have visual experiences in connection with their VIEs, they certainly are able to engage in VIEs with visual content.

The question that remains is that of *how* aphantasics experience their VIEs. While the subjective experiences of aphantasics may and, as I will argue below, most likely do vary, a promising first step towards an answer is to consider an example of how an aphantasic describes his own experience of his imaginative process. For this, we will now look at one of the most popular Blog entries on the topic of aphantasia, in which Blake Ross, the co-creator of the internet browser Mozilla Firefox, describes his experience of imagining a beach.

If you tell me to imagine a beach, I ruminate on the “concept” of a beach. I know there’s sand. I know there’s water. I know there’s a sun, maybe a lifeguard. I know facts about beaches. I know a beach when I see it, and I can do verbal gymnastics with the word itself. But I cannot flash to beaches I’ve visited. [...] I have no capacity to create any kind of mental image of a beach, whether I close my eyes or open them, whether I’m reading the word in a book or concentrating on the idea for hours at a time—or whether I’m standing on the beach itself. And I grew up in Miami. (Ross, 2016)

Ross’ description of his experience of imagining a beach is very informative for our inquiry into aphantasic imagery for a couple of reasons.

Firstly, Ross states that when he imagines a beach, he thinks about the *concept* of a beach. This already brings me directly to the intuition behind the idea of proposing that aphantasic imagery can be understood as type imagery. For recall that a type, roughly speaking, is a class of things or a concept. To use Peirce’s (1906, p. 423) words, the concept ‘beach’ is “a [s]ingle thing” and it “does not exist; it only determines things that do exist”, namely all the token beaches that sighted people can see or that hyperphantasics can imagine.

Secondly, the content of Ross’ imagining, as a function of its conceptual (i.e., type-like) nature, does not (at least not initially) force him to make any commitments with respect to the details of his imagining of a beach; only through rumination does he begin to add details to the imagining. The first details that he states are that he knows that there is water and sand.⁸⁰ Then, he adds that there is a sun and *maybe* a lifeguard. Thus, unlike a hyperphantasic’s visual

⁸⁰Notice that the statement “I know there’s sand [at a beach].” is technically false, because it implies that there is sand at *any* beach, which fails to account for both pebble and rocky beaches. Thus, it is not a fact about beaches that there is sand but rather a feature that we attribute to our stereotypical idea of a beach (although this might, of course, vary depending on where we grew up).

image of X, which is fixed in its content in the sense that I have described above, the aphantasic's imagining of X is *initially non-committed with respect to any visual details*.

Thirdly, Ross states that he can do “verbal gymnastics with the word itself”. While there may be multiple ways of interpreting this, I think that this use of words is indicative of his ability to perform what I have referred to as meta-imaginative acts, i.e., acting as if one were visualising. In order to make this point, we must first move on from the mere imagining of a concept to the role that the concept plays in an aphantasic's VIE. For notice that not every imagining is a VIE, since we defined a VIE as a volitional mental activity whereby an agent A represents a possible state of affairs S to themselves, and merely thinking about a word or a concept does not yet involve the representation of any state of affairs. Thus, let us now consider how an induced VIE might be experienced by an aphantasic and how this differs from the experience of a hyperphantasic with respect to the same scenario, as well as what consequences their different experiences have for their respective reports.

Suppose that an aphantasic and a hyperphantasic are visiting a relaxation course, as part of which they are told “Now, close your eyes and imagine a beach!”. If my argumentation so far was sound, we should expect that the hyperphantasic immediately (almost compulsively) generates a highly vivid image of a specific (token) beach, including a range of fixed visual details, such as whether the beach is a sand, pebble or rocky beach, whether there are people on the beach or not, whether there are palm trees or not, etc. The aphantasic, on the other hand, will not be able to generate any visual mental image and will instead access the concept ‘beach’ in her mind. Suppose that the instructor then says “Tell me what you see!”. In response to this, the hyperphantasic will give a description of his mental image, i.e., of the content of the visual experience that he has generated. The aphantasic, on the other hand, will recall features of stereotypical beaches, such as that there is sand and water at a beach and may then move on to consider other possible details, such as whether there is a life-guard on her beach or not, etc. Thus, and this is crucial, the aphantasic is *progressively constructing a token beach over time*. However, since the process of describing one's mental image also occurs over a period of time, there will be no way (for the instructor) to distinguish whether a description such as “I see sand and water. The sun is shining. I see palm trees and in the shadow of the palm trees I see a group of people playing cards.” is the result of a description of an instantaneously generated token beach (hyperphantasia) or a progressively created token beach that *started* as an abstract concept and was never accompanied by any actual visual mental image (aphantasia).

Thus, we can conclude that *an aphantasic agent, while initially starting any VIE at the type-level of imagery, can access the token-level of imagery indirectly, by means of using meta-imagination* (we might refer to this as the *meta-imagination theorem*). This is so because the content of aphantasic imagery is initially type-like, i.e., abstract and conceptual. But meta-imagining X has (except for the decisive question “Do you have an actual quasi-perceptual experience?”; see section 4.1.2) the same behavioral correlate as imagining₂ X,

namely (re)acting as if one were seeing X, which means reporting information about the visible qualities of the imagined X. But fixing visible qualities of X generates imagery content that is located at the token-level of imagery. Therefore, by using meta-imagination in order to fix visible qualities of X in their report of their VIE, an aphantasic agent, initially starting at the abstract type level, can access the token-level of mental imagery indirectly, i.e., can provide token-level descriptions of their imaginings.

Notice that my proposed type-token distinction with respect to the content of mental imagery is not only, as I have argued above, reminiscent of the distinction between the depictive and propositional divide discussed in the imagery debate (see section 3.1.1), but also captures the differing standpoints of Locke and Berkeley in their debate about abstract ideas (see section 2.1.2). On the one hand, token imagery, which I have associated with hyperphantasia, with its demand for commitment with respect to visible details, captures Berkeley's idea that "whatever hand or eye I imagine, it must have some particular shape or color" (1710, x). Type imagery, which I have linked to aphantasia, on the other hand, due to its abstract and conceptual content, is in line with Locke's concept of ABSTRACTION, by means of which ideas are considered "as they are in the mind such appearances, separate from all other existences, and the circumstances of real existence, as time, place, or any other concomitant ideas" (1689, II.xi.9). Therefore, in line with what I called the 'weak phenomenological claim', i.e., the claim that based on one's own imagery phenomenology one can make definitive statements about one's own imagery capacity (see section 2.3), we should acknowledge that, although neither Berkeley nor Locke seem to be right with respect to imagery capacity in general, their seemingly contradicting views of the imagination might quite accurately outline the phenomenology of aphantasics (type imagery) and hyperphantasics (token imagery) respectively.⁸¹

In conclusion, both the concept of meta-imagination and the type-token distinction that I proposed in this section were foreshadowed in the philosophical and empirical literature. With respect to meta-imagination, the fact that thousands of congenital aphantasics were unaware of their imagery deficit clearly implied that they are able to play the language-game of visualisation, and my concept of meta-imagination merely provides a concrete explanation of *how* they are doing so. And in the context of the type-token distinction, this distinction was foreshadowed already by one of the earliest debates on mental imagery, namely by Locke and Berkeley's disagreement with respect to abstract ideas.

⁸¹Based on this, one might even want to suggest that, perhaps, Berkeley was a hyperphantasic, while Locke was an aphantasic. While I myself would not want to go that far, it is interesting to consider that a study conducted by Reisberg and colleagues (2013) found that the positions taken by some participants in the imagery debate were correlated with their own VVIQ scores (with participants with higher VVIQ scores being associated with the pictorialist side and those with lower scores being more sympathetic with the descriptionalist view), thus providing some evidence for the suggestion made by Berman (2008) that there is a connection between one's own imagery phenomenology and one's theoretical views on the imagination.

4.2 Meta-Imagination: Applications and Implications

4.2.1 The Visualiser’s Fallacy

After our analysis of the evidence from behavioral and neuroscientific research, which led us to reject the ‘Aristotelian’ assumption that aphantasics would be gravely cognitively impaired (see section 3.2.3), as well as our considerations regarding the concept of meta-imagination, which showed us that voluntary imaginative episodes (VIEs) do not necessarily involve acts of visualisation (see section 4.1.2), we can now delineate what I will refer to as the *visualiser’s fallacy*.

The **visualiser’s fallacy**: Since normal visualisers have accompanying object imagery phenomenology in the course of solving (visual imagery) tasks, they falsely assume that the inability to visualise prevents aphantasics from performing said tasks.

The visualiser’s fallacy is built onto two assumptions. Firstly, the visualiser assumes that their object imagery phenomenology that accompanies the solution seeking process is causally related to their task performance, i.e., that they can solve the task *because of* their object imagery. Secondly, the visualiser assumes that their strategy for solving the task (i.e., the strategy that is accompanied by the imagery) is the only way the task can be solved. These two assumptions are necessary for the fallacy, for if the visualiser would not assume that their visual imagery were the reason for their success on the task, or if they would not also assume that there can be another strategy by which the task can be solved, there would be no reason to assume that an aphantasic could not also solve the task. The logic behind the fallacy can thus be made explicit as follows:

- (A1) The accompanying object imagery is essential for the visualiser’s strategy on the task.
- (A2) The visualiser’s strategy is the only viable strategy for the task.
- (A3) Aphantasics cannot visualise.
- (C1) Aphantasics cannot use the visualiser’s strategy.
- (C2) Aphantasics cannot solve the task.

This means that in order to point out the visualiser’s fallacy, it suffices to show that the task can be solved by means of another strategy that does not involve acts of visualisation, thus disproving A2. We might refer to this as the *weak rejection*. However, there is also a possible *strong rejection*, namely showing that, for the task in question, object imagery is not even necessary for the strategy the visualiser is using (think about Liesefeld and Zimmer’s [2013] suggestion that spatial imagery, instead of object imagery, is the essential ingredient in the visualiser’s solution seeking process on the mental rotation task [see section 3.1.2]), thus disproving A1. This second rejection is stronger, since it not merely shows that the task can be solved by strategies other than

using object imagery but that it, in fact, *is* solved by other means (e.g., spatial imagery use), not just by the aphantasic agent but by *everyone*.

One might assume that the concept of meta-imagination aims at disproving A2 for VIEs, i.e., that I am trying to show that ‘acting as if visualising’ is another viable strategy next to ‘actually visualising’ and that both strategies enable the agent to form a VIE, as indicated by the verbal or non-verbal report that they can give of their VIE (think, for example, about the case of imagining a beach). And while this interpretation of the workings of meta-imagination is justified and disproving A2 on its own would already suffice for showing that the visualiser’s fallacy applies to the type of cases of VIEs that I have discussed above, I would now like to go one step further and suggest that even for visualisers the accompanying object imagery, with respect to a wide range of so-called visual mental imagery tasks, is *not* the essential ingredient of their performance, i.e., I want to use meta-imagination to challenge A1.

Moving forward, it is important to point out that I do not necessarily take the visualiser’s fallacy to be applicable to all visual mental imagery tasks. In fact, every (type of) visual imagery task should be investigated separately, in order to check whether the visualiser’s fallacy is applicable, since every (type of) task has its own specific contextual demands. For example, while the visualiser’s fallacy seems to apply to visual working memory and mental rotation tasks, it does not seem to apply, in the same way, to episodic memory tasks, since, as we have seen, the inability to visualise does, on average, negatively affect the amount of episodic details reported by aphantasics. Therefore, the goal is *not* to show that the inability to visualise never makes a difference but rather to argue that our analysis of the concept of meta-imagination shows us that the visualiser’s fallacy is applicable to a large *variety* of types of imagery tasks.

Meta-Imagination and (Tacit) Knowledge

A crucial idea that underlies meta-imagination is the Wittgensteinian idea that *we construct our mental images*. More specifically, instead of ‘seeing’ our mental image, which implies us taking the role of a passive observer with respect to our own images, we *create* our imagery; *this* is the nature of visualisation.

Forming an image of something is comparable to an activity. (Swimming.) When we form an image of something we are not observing. The coming and going of the pictures is not something that *happens* to us. We are not surprised by these pictures, saying “Look! ...” (RPP II §88/Z §632)

In order to make this point clear, let us ask ourselves where mental images ‘come from’, or what they are based on. Consider the example of the beach. If I tell a normal visualiser to visualise a beach, then she will likely not have a problem to tell me about the beach they she is visualising. So far so good. But now imagine that I ask her to visualise a Knorfengnorf (or any other non-sense word). There are two possibilities: either the visualiser tells me that she *does*

not know how to, or she will try to visualise whatever *seems* or *feels* right, i.e., what she associates with the sound of the utterance ‘Knorfengnorf’. But what is the difference between the task to visualise a beach and that to visualise a Knorfengnorf? The difference is that the agent has a *concept* of a beach, meaning that she knows what a type beach is, whereas she does not have a (stored) concept of a Knorfengnorf because I just made this word up and therefore there have not been any token Knorfengnorfs that she could have encountered in real life or fiction, thus making her unable (without some additional use of imagination) to deduce what a type Knorfengnorf could be. And if she were to say something like “My Knorfengnorf has green boots and a top hat on one of his five horns.”, then this is not because she can visualise a Knorfengnorf but because she is *imaginative enough* to make associations based on the sound of the utterance which then enables her to create a visual image. Thus, her ability to visualise a Knorfengnorf is conditional on another type of imagination, which is neither reducible to imagination₁ nor imagination₂, and which we might want to define as sort of *creative imagination*, by means of which an agent makes new associations based on given input (we might call this imagination₃).⁸²

The important point is that any formed mental image is *informed* by something, namely either by the agent’s previous knowledge and memories, or by ad hoc associations.⁸³ Therefore, the fact that someone is able to form a mental image of something, implies that they already have a concept of what they are forming an image of *prior* to the act of visualisation.⁸⁴ And this shows us now even more clearly why aphantasics do not struggle on a wide range of what is considered to be ‘imagery tasks’. For the assumption that a typical ‘imagery question’, such as “Is the green of grass darker than the green of a pine tree?” (Zeman et al., 2010, p. 147) is solved *by forming an image*, makes the mistake of not understanding that an image that corresponds to the correct answer can only be formed if the agent that forms the image already *knows* (at least tacitly) what shade of green both grass and pine trees have. And this information, as well as the inferential reasoning that needs to be conducted on it in order to provide the correct answer, can be represented propositionally as follows:

- (P1) Grass is light green ([tacit] knowledge)
- (P2) Pine trees are dark green ([tacit] knowledge)
- (P3) Dark green is darker than light green (by definition/logic)
- (C1) The green of pine trees is darker than that of grass.

⁸²It should be noted this type of imagination is not merely applicable to artists but also to any area where an agent produces novel solutions to existing problems, such as in mathematics, philosophy, etc. While we will not discuss the creative imagination in more detail in this thesis, the investigation of the creative process of aphantasics is an important topic for future inquiry.

⁸³And notice that these ad hoc associations, at least in part, are themselves also informed or influenced by previous knowledge and memories.

⁸⁴Notice here that this does not mean that the agent necessarily is consciously aware of their knowledge of the concept at the time they are forming their image. The concept of tacit knowledge (Pylyshyn, 2002; see section 3.1.2) is useful in this context.

Once we realise that the mental image of the grass and the pine trees in visualisers is informed by their knowledge about grass and pine trees (which, in turn, is based on their past experiences involving token grass and token pine trees), we understand that this knowledge is completely sufficient for answering the question correctly and thus passing the ‘imagery test’, as MX, in fact, does.

Considering the foregoing discussion in the context of the visualiser’s fallacy, it now makes sense why visualisers may initially falsely assume that aphantasics would be gravely cognitively impaired. For indeed, if the visualiser uses their mental imagery for all kinds of *knowledge* tasks, and if they assume that the imagery is essential for these tasks (A1), then they would assume that simple tasks, such as correctly answering the question about the different shades of green of grass and pine trees, could not be solved by aphantasics. Thus, the visualiser falsely assumes that the inability to visualise puts aphantasics at an *epistemic* disadvantage (the visualiser might be thinking “How could they possibly know this if they cannot visualise it?”). However, this thinking is backwards, since the visualiser’s image rests on their knowledge, instead of their knowledge resting on their image. So, although the absence of knowledge implies the inability to form a corresponding mental image, the inability to form a mental image does not imply the absence of the corresponding knowledge. Therefore, the assumption that aphantasics would be at an epistemic disadvantage compared with visualisers, with respect to a broad range of knowledge questions, the answers to which visualisers falsely assume to be grounded in their accompanying imagery, is merely an instance of the visualiser’s fallacy (specifically, an instance of A1).

At this point, the relationship between meta-imagination and the visualiser’s fallacy becomes more graspable. For the underlying reason for why the behavioral correlate of meta-imagining X and visualising X (where X can be any potentially observable object or state of affairs) is identical (see section 4.1.2) is that both meta-imagining X and visualising X rely on the agent’s knowledge about X. In order to see this, let us consider another example.

To move away from cases of meta-imagination involving verbal report, let us quickly recall the example of the ‘bouncy ball task’ (see section 3.1.2). Here, the experimenter acts as if they were dropping a ball and the participant has to indicate when the ‘ball’ hits the floor (e.g., by pushing a button). I have argued that while visualisers might solve the task by visualising the ball and tracing it with their eyes, aphantasics could simply use meta-imagination, i.e., act as if they are visualising it, which means, in this case, performing the eye-movements that they would expect to be making if they were visualising the ball. I then argued that an experimenter, solely based on their observation of the subjects eye-movements during the task, would not be able to tell whether the subject is visualising the ball or meta-imagining the ball. And now we can see why, namely because, in both cases, the eye-movements are based on the agent’s knowledge, or, more precisely, on the agent’s beliefs about the falling speed of an *actual* ball, which are, in turn, grounded in their prior knowledge (e.g., about the laws of physics), as well as their memories of instances where

they actually experienced *seeing* balls (or any other object) fall down.⁸⁵

So, for any task that seemingly requires visualising X, we can ask ourselves “Would knowing what X would look like be sufficient for solving this task?”, and if the answer is affirmative, then an aphantasic can potentially solve the task, e.g., by means of meta-imagination, and assuming that they cannot would likely amount to committing the visualiser’s fallacy. For in both visualising X and meta-imagining X, the crucial underlying (implicit) question that any agent ought to ask herself is “What would X look like?” and answering this question, in many cases, merely demands for *knowledge* and not for visualisation.

4.2.2 Internal Description, External Reference and Spatial Sense

We have seen how aphantasics can use their knowledge and creativity in order to solve a wide range of supposed ‘imagery’ tasks. Let us now consider another everyday task in which one might assume that mental imagery is necessary. As part of the effort to understand aphantasia by listening to the aphantasic community, I have constructed a qualitative questionnaire in which I asked aphantasics about their own experiences with the condition.⁸⁶

One of the questions in the questionnaire asked the participating aphantasics to consider the following task:

You are constructing a cupboard and have to drive a screw into the wood of the cupboard wall. In another room, you have a set of screwdrivers of different sizes which you can use for the task. What strategy would you use, in order to pick the correct screwdriver (assuming that 1. you can only bring one screwdriver back into the room with the cupboard at a time and 2. you are not allowed to bring the screw into the room with the screwdrivers)?⁸⁷

The idea behind giving the aphantasics this task (or asking them to imagine to be confronted with this task) was that a normal visualiser would arguably solve this task by forming a visual mental image of the screw, in order to then

⁸⁵This line of reasoning can also be extended to the beliefs about the ‘bounciness’ of the imagined ball, which are informed by the agent’s prior knowledge and experiences of observing the ‘bounciness’ of balls and other object, and so on.

⁸⁶Eligibility for participation was based on an assessment by means of the VVIQ, which was administered to every potential participant at the beginning of the questionnaire. Participants with a VVIQ of 25 or lower were deemed eligible. In using a score of 25 on the VVIQ as the cut-off to classify people as aphantasic, I am following Pounder and colleagues (2018, 2022), who classified participants with a score of 16 as a “severe sup-group” [Pounder et al., 2022, p. 186; see footnote 47]). Twenty four participants were deemed eligible for participation, fifteen of which had a score of 16, the lowest possible score, and the mean VVIQ score of the sample was 17.125, with only one participant scoring at the eligibility limit value of 25 (no participants were excluded due to their VVIQ score). A link to a template of the questionnaire I have constructed, as well as to the raw response data, including age ranges, education and occupations of the participants and their answers to the (other) qualitative questions can be found as a supplement in the Appendix.

⁸⁷The second restricting assumption was added after the first participant who took the questionnaire stated that they would simply take the screw into the room with the screwdriver. At the time the second participant was responding this additional rule/restriction was in place.

pick the screwdriver in the other room ‘based on’ their mental image of the screw. So, I wanted to investigate how aphantasics would solve this task.⁸⁸ Notice here that instead of using one’s creative imagination in order to come up with any token of a specific type (as in the example of imagining a beach), there is a correct solution and this solution is itself bound to a material token, namely the specific screw for which one needs to find the corresponding screwdriver.⁸⁹

The answers to the screwdriver question were sorted into five overall categories: Internal Description (ID, 9 members), External Reference (ER, 9 members), Spatial Sense (SS, 6 members), Rule-break (RB, 1 member), and Starting with Middle size (SM, 1 member).⁹⁰ Since the categories RB and SM are self-explanatory and only consisted of one member each, we will not discuss them here and focus on the categories ID, ER and SS instead.

Participants were sorted into the *Internal Description* (ID) category if their reported strategy involved 1) visually assessing the screw, 2) making a sort of ‘mental note’ consisting of its properties (e.g., shape, size, etc.) and 3) using this mental note in order to determine which screwdriver to choose in the other room. The following answers are examples of participants that were sorted into the ID category:

Participant 3: I would remember the attributes of the screw head (cross, straight, hexagon, small, large) then select the screwdriver with the matching attributes.

Participant 23: I would look at the screw head to see if I needed a Philip’s head or a regular screwdriver, I would describe to myself the approximate size of the screw head..... and I might still have to run back and forth to get the right size.

In using this strategy, aphantasics gather information about the screw, based on which they gain knowledge about (some of) the attributes a screwdriver has to have in order to match the presenting task. The knowledge about the required properties can then be stored in the form of semantic memory (i.e., as a list of facts about the properties of the screw) and used in order to pick the correct screwdriver in the other room shortly after.

⁸⁸It is always useful to keep in mind that if we were to follow the Aristotelian dictum that the soul cannot think without a phantasma, we should expect that aphantasics would already fail in the mere attempt of imagining being in the described scenario in the first place. For to imagine to be in a specific situation, independently of the context and specific task described in said situation, is already an imagination task in itself, since it necessitates representing a possible state of affairs to oneself (see our definition of VIEs in section 4.1.1).

⁸⁹In this way, the screwdriver question is comparable to the mental rotation task, because in both cases there is a correct solution that is dependent on a concrete material token (in the mental rotation task, it is the figure on the paper that has to be ‘rotated in the mind’). However, notice that this does not mean that there is no room for creativity in the way the task is being solved, it merely means that the end result is either correct (picking the correct screwdriver) or incorrect (picking the incorrect screwdriver) and the range for variation in the end result is more narrow than in the beach example, where one can produce an infinite amount of token beaches that would meet the criteria of the task “Imagine a beach!”.

⁹⁰Two participants, P2 and P5, were sorted into both the IV and the SS categories.

Notice that certain properties are better suited for internal verbal descriptions than others. For example, whether a screw requires a flat or a phillips screwdriver can easily be assessed, since the variable is qualitative (i.e., categorical). A quantitative variable, such as size (in cm), however, might be harder to determine by means of visual assessment alone, especially when there are only small differences between the size of the available screwdrivers. However, if the differences between the sizes of the available screwdrivers are sufficiently big, one might still be able to use labels such as “big”, “medium”, and “small”, without having to remember the exact size of the screw. But notice here that factors that would make the task more difficult for aphantasics, such as only minimal differences between size in screwdrivers or a large amount of possible screwdrivers to choose from, would make the task harder for visualisers as well.

Since the task did not specify any properties of the screwdrivers, participants likely drew from their own past experiences with similar situations when filling in these missing details. And while some participants (e.g., Participants 3 & 15) did not mention any concerns about the success of the IV method, others admitted that they might not be successful in estimating the size of the screw right away (e.g., Participants 9, 22 & 23), stating that it might “take several attempts by trial and error” (Participant 9), or that they “might still have to run back and forth to get the right size” (Participant 23). Thus, we see that while qualitative properties are easily retained by means of the ID method, quantitative properties, such as the specific size of the screw, may still present a problem. Furthermore, contextual factors, such as how many options are available or how these options compare with respect to their quantitative properties, may determine the extent to which the ID method can be used reliably.

A possible way of circumventing the problem of being unable to determine quantitative properties by means of visual assessment alone is represented by the strategy category *External Reference* (ER). Participants were sorted into this category if their strategy involved 1) comparing the size of the screw with an external reference object (e.g., a fingernail) and 2) using the reference object in the other room in order to determine the correct screwdriver. The following examples are answers of participants that were sorted into the ER category:

Participant 14: I would measure the screw in Room 1 with something else, like a ruler, fingernail or some other object. Then I would take that object with me to Room 2. I would need some stateful data between room 1 and 2.

Participant 22: I always document what needs measurements. I would indicate what the size of the head of the screw is on paper, or if that isn't available, measure against something like my fingernail (indicating with a fingernail from the other hand the measured size). When I get to the room where the screwdrivers are, I can quickly compare to see which is a match for the needed size. Just one trip.

Notably, none of the participants in the ED category mentioned any concerns regarding the success of this strategy. What is important to notice here is that

while these participants only mention the size of the screw explicitly, their belief that their method is working (which likely is based on memories of past instances where it did work), shows that their actual strategy must include an internal description of the qualitative aspects of the screw as well. For if measuring the size of the screw were the only thing they were doing, then they would have no idea what type of screwdriver (e.g., flat vs phillips) they would have to use. Thus, instead of representing an alternative strategy to ID, we should view ER as an adjustment of ID, which helps the agent to compensate the single shortcoming of the ID strategy, namely its difficulty with determining differences between options with respect to quantitative properties.⁹¹

Lastly, let us consider the category *Spatial Sense* (SS). Participants in this category reported that they were using their sense, feeling or intuition, in order to determine the spatial properties of the screw, and that they used the same sense, in order to choose the screwdriver of the corresponding size. Examples of answers that were sorted into this category include the following:

Participant 6: While I definitely can't visualize, I do have a good spatial sense, and that seemingly includes relative sizing. So, I can take note and remember the size of the screw for at least the amount of time it would take to pick out an appropriate screwdriver. If I had to return to the job site some hours later, however, I think I would lose this sense, and I'd have to re-reference the screw.

Participant 11: While I cannot see the screw when I leave the room, I have [a] very good spatial sense so it is easy to measure the size and shape of the screws. So I would find the screws that most needed to be used to get the cupboard into the right shape, take mental measure [of the] shape of those screws and go find the best match in the other room. Repeat until complete.

What both of the participants above refer to as “spatial sense” can likely be connected with the concept of spatial imagery that we have encountered in our discussion of the mental rotation task (see section 3.1.2). For recall that both Crowder (2018) and Pounder et al. (2022) proposed that the successful performance of aphantasic participants on the mental rotation task is likely accounted for by their intact spatial imagery and that aphantasics’ self-reports across multiples studies (Bainbridge et al., 2020; Dawes et al., 2020) indicate that they possess unimpaired spatial imagery. Furthermore, recall that spatial

⁹¹When discussing the use of external (reference) objects in order to ease the cognitive workload of the agent, we must also quickly mention the concept of *extended cognition* (Clark & Chalmers, 1998). According to Clark and Chalmers, when an agent makes use of external objects, such as calculators or maps, they are building a coupled system, in which the agent and the object form a joint cognitive process. Thus, in the case where the aphantasic uses an external object, such as their fingernail, in order to solve the screwdriver task, Clark and Chalmers would view the object as playing an active part in the cognitive process, opposed to it merely playing a passive role (this view is called *active externalism*). Viewed from this perspective, the use of an external reference object does not differ significantly from that of an ‘internal’ one, such as a visual mental image, and both cases represent an act of cognition.

imagery and object imagery are associated with the dorsal and ventral stream respectively, meaning that they can be selectively impaired (Pearson, 2019), thus strengthening the hypothesis that aphantasics can indeed possess intact spatial imagery abilities, despite being unable to form any object imagery.

The possibility of correctly estimating the size of the screw by means of spatial imagery now invites us to revisit our considerations regarding the ID strategy. As we have seen, while some participants employing this strategy did not explicitly mention any concerns regarding its success (e.g., participants 3 & 15), others were less confident (e.g., participants 9, 22 & 23). One possible explanation for this observation would be that those participants who were more confident in the technique possess a more accurate spatial sense than those who were less confident. Furthermore, we might hypothesize that participants who reported using the ER strategy might also have a weaker spatial sense than those participants who confidently reported using the ID strategy, and that they have learned to use the ER strategy as a supplement to the ID strategy, in order to compensate for their comparatively weaker spatial imagery abilities.⁹²

Based on the example of the screwdriver task, we can draw some tentative conclusions with respect to the ability of aphantasics to perform these kinds of everyday tasks, for which visualisers may report using their visual images.

With respect to qualitative properties (e.g., flat vs phillips), we have seen that aphantasics can use internal (verbal) descriptions, in order to retain the same information that may be ‘contained in’ a visual mental image. With respect to quantitative properties (e.g., size), we have seen that aphantasics might estimate these either by means of using their spatial imagery, or by using other external objects, such as one’s own body parts, as reference points. So, both ID + ER and ID + SS provide alternative ways of solving the screwdriver task without any accompanying object imagery phenomenology. Thus, since we disproved A2, i.e., the assumption that the visualiser’s strategy is the only strategy to solve the task, we can conclude that the belief that aphantasics are not able to solve this kind of task is another instance of the visualisers fallacy.⁹³

⁹²In order to test this hypothesis, one could use a spatial imagery questionnaire, such as the Object and Spatial Imagery Questionnaire (OSIQ), in order to assess the aphantasics spatial imagery abilities, then ask participants how they would carry out the task and check whether the OSIQ scores of the aphantasics can predict which strategy they report to be using for the task. Furthermore, one could also assess the participants’ confidence in their strategies, e.g., by asking them how many times they expect to be going back and forth. However, in this case we, of course, also need to fix some of details of the task, such as how many screwdrivers are available and how they are differing in size, since these contextual factors, as argued above, can obviously affect the participants confidence. One possibility would be to include pictures of the screwdrivers that can be used. Of course, the best way would be to actually ask aphantasics to carry out the task in a laboratory setting (note that here one can also use ‘amount of available options’ and ‘difference in size between available options’ as additional independent variables that could be varied between different groups). The current discussion of the screwdriver question should therefore be seen as a preliminary study which aims at conceptualising the problem space and might provide useful suggestion for future research.

⁹³One could also attempt to show that A1, i.e., the assumption that the accompanying object imagery phenomenology is essential for the visualiser’s strategy, is false, by arguing that the visualiser’s object imagery phenomenology is merely a product of their applying the ID + SS strategy unconsciously. This mirrors the situation we encountered in mental rotation

4.2.3 The Wittgensteinian Twist

In section 4.1.2, I have argued that aphantasics can play the language-game of visualising, by means of using meta-imagination. In section 4.1.2, I have then argued and shown, by means of a concrete example (the hyperphantasic and the aphantasic describing their VIE of seeing a beach), that aphantasics can access what I referred to as token-level imagery, by means of meta-imagination. Now, my final argument regarding aphantasic imagery and meta-imagination is that, viewed from a Wittgensteinian perspective on mental imagery, *aphantasics are able to form visual mental images*.

At first, the suggestion that aphantasics are able to form visual mental images seems to run against everything that I have argued in sections 4.1.2 and 4.1.3. After all, I have argued that aphantasics are not able to use *imagination₂*, which I defined as the act of generating a visual mental image corresponding to (the content of) a VIE, and I stated that aphantasics can play the language-game of visualising, despite their inability to actually form a visual mental image. So, why would I now want to argue that aphantasics *can* form visual mental images?

Recall the three ways of understanding the term ‘mental imagery’ (Thomas, 2014) we have outlined in section 1.1 above. According to this distinction, ‘mental imagery’ can be understood as

- (1) quasi-perceptual conscious experience *per se*; OR
- (2) hypothetical picture-like representations in the mind and/or brain that give rise to (1); OR
- (3) hypothetical inner representations of any sort (picture-like or otherwise) that directly give rise to (1).

Notice here that (2) and (3) point back at (1), meaning that all three ways describe mental imagery as involving a quasi-perceptual experience, where ‘quasi-perceptual’ (at least with respect to the visual modality) is to be understood as ‘akin to seeing’. This understanding of mental imagery, as involving quasi-perceptual experience, was what led us to state above that aphantasics are not able to form visual mental images, meaning that ‘unable to form visual mental images’ should be read as ‘unable to generate a quasi-perceptual experience that is akin to seeing’. And understood from this perspective, aphantasics indeed cannot form any visual mental imagery (*this* is what aphantasia is).

However, let us now recall Wittgenstein’s definition of mental imagery in order to gain a different perspective onto what a visual mental image may be.

A mental image is the image which is described when someone describes what he imagines. (PI §367)

tasks, where either aphantasics were using spatial imagery as an alternative strategy, or using spatial imagery was the default strategy to being with. However, notice that making the weaker claim that using the ID + SS strategy represents an alternative strategy next to the visualiser’s strategy already suffices to show that the visualiser’s fallacy is applicable.

Notice that Wittgenstein’s definition of a mental image, unlike all three of Thomas’ (2014) ways of understanding the term, makes no recourse to any quasi-perceptual experience. Instead, on Wittgenstein’s account, our description of our mental image represents the mental image, without making any demands as to what the subjective experience accompanying the description of the image consists of. Furthermore, while the mental image, for Wittgenstein, indeed needs to stand in a relation to observable behavior (cf. PI §580: “An ‘inner process’ stands in need of outward criteria.”), he, unlike behaviorists such as Watson, does not deny that there is such a thing as a mental image that might involve quasi-perceptual experiences. However, since the outward behavioral criteria of mental images, e.g., the verbal report given or the drawing made by an imagining agent, are the only observable parts of the imagining, and are therefore the only elements that can directly feature into our language-games, i.e., constitute the practices in which the word ‘imagination’ is used, the performing of the characteristic behaviors, e.g., reporting a color when asked about the apple one imagines, suffice in order to participate in said practices.

While this does not mean that visualising-behavior with accompanying object imagery phenomenology is the same as visualising-behavior without accompanying object imagery phenomenology (cf. PI §304: “What greater difference could there be?”; cf. LPP I §854: tennis without a ball [see section 2.2.2]), to think that just because aphantasics do not have object imagery phenomenology they cannot exhibit visualising-behavior makes the mistake to assume that the non-aphantasic derives his knowledge about mental images from his own experience of mental images, i.e., it makes the mistake of taking the private experience of the mental image to be the referent of the term ‘mental image’. More specifically, this special instance of the visualiser’s fallacy occurs due to the false assumption that it is the image, instead of the practices for which we use our mental images, i.e., the point that their use has with respect to the goals within our community, that constitutes the meaning of the term.

But the point that mental images have, just as the goals for which we employ them, varies based on the situational context. The ‘police sketch scenario’ asks for a different use of imagination than the ‘art therapy scenario’ (see section 2.2.3). And, while outlining what the language-game of visualising X, in the Wittgenstein-ish way that I have defined it above, might consist of was useful in our investigation of the concept of aphantasia, we must recall that there is, in reality, no such thing as *the* language-game of visualisation, only a multitude of contextual practices which involve acts of visualisation. However, *many of the scenarios that one might assume to be asking for visualisation specifically, actually are only asking for imagination.* This is the lesson that we can learn from Wittgenstein’s description of *imaginability as representability* (PI §397).

Recall the example of the hyperphantasic and the aphantasic at the relaxation course and imagine now that, instead of describing their beach verbally, they make a drawing of it. Now, the drawing of the aphantasic represents her mental image, just as the drawing of the hyperphantasic represents his. And if someone were to ask “What did the aphantasic imagine?”, then we could point at her drawing and say “This!” (although she, of course, retains first-

person authority with respect to what ‘this’ depicts, i.e., what it is a drawing of [see section 2.2.3]). Both the drawing and the verbal description are media in which the aphantasic can represent what she imagines, and her ability to represent shows us that she can imagine it. However, we might, due to the bias that we have with respect to our own imaginings, falsely assume that her ability to represent what she imagines implies an ability to *visualise* it.

The same thing happened in the case of mental rotation tasks, the visual working memory tasks, the screwdriver task, or the question about the different shades of green. The aphantasic agent is able to represent the information, be it propositionally, or spatially, or in whatever other possible medium of representation, and her ability to represent it correctly, as evidenced by her solving the task, which can be judged according to her behavior, confuses the visualiser, because they think that this must mean that she has visualised *something*. Following this assumption, they end up making suggestions, such as that aphantasics are merely unconscious of their imagery, since they cannot imagine that object imagery phenomenology is not necessary to solve the task. The visualiser clings to the assumption that representability implies visualisability, i.e., that the ability to visualise is necessary in order to represent (visual) information, just as Wittgenstein’s fictitious interlocutor clings to the referential model and, in both cases, shifting the focus away from internal experiences and towards the practices into which mental images are woven can resolve the confusion.

Rethinking visual mental imagery

Can aphantasics form visual mental images? Judging from their observable behavior with respect to a wide variety of tasks that ask for visual imagination, i.e., for the ability to represent visual information, we must come to the conclusion that they can. This does not mean that they can visualise, but that is, as we have seen time and again throughout our preceding investigation, not necessary to solve the task, i.e., to carry out the practice, the point of which is defined by its goal. And now we see that while the ability to represent X does not imply the ability to visualise X, *the ability to act as if one is visualising X, i.e., the ability to meta-imagine X, implies the ability to imagine X, i.e., to represent X in a medium of representation*, be it verbal, or spatial, or else.

This brings us to the crucial point about meta-imagination. One may think that meta-imagination is some sort of trick that aphantasics consciously use, in order to deceive their visualising peers.⁹⁴ But that is not the crucial point. To see this, let us move away from understanding ‘acting’ as ‘pretending’, as in the case of an actor on a stage, and consider acting in the sense of the ‘acting individual in the world’ instead. Viewed from this perspective, meta-imagination is not a tool that the actor can ‘use’ but, instead, serves as a *factual description* of the actions, i.e., the behavior of aphantasics, namely that many congenital aphantasics act as if they are visualising *all the time*, without others, or, in

⁹⁴And surely, an imaginative aphantasic could easily deceive others by telling them that she can visualise X and then merely meta-imagine X, i.e., act as if she is visualising X, as described above (see section 4.1.2).

many cases, even they themselves, noticing that they are not actually visualising. They describe the beaches that they ‘visualise’ without actually visualising them, they rotate the three-dimensional figure without accompanying object imagery phenomenology, and they recall the furniture depicted in a picture of a room, as part of a visual working memory task, without ‘looking at’ an ‘inner picture’ of the room (or of the picture of the room) ‘in their mind’. And, crucially, *they are able to form visual mental images*, i.e., to provide representations of visual information, without the ability to visualise.

What this shows us is it that either we are mistaken with respect to the assumption that many of our current visual imagery tasks require the use of visualisation, meaning that we should change their name, e.g., calling them ‘representation tasks’ or ‘knowledge tasks’ instead, or we must acknowledge that, as I have argued here, aphantasics are able to form visual mental imagery, that this is evidenced by their successful performance on visual imagery tasks, and that the ability to visualise, while surely being connected with the ability to form visual mental images in an important sense, is not synonymous with it.

More generally, there is a question regarding our further use of the term ‘visual mental imagery’, which boils down to whether we want the ‘visual’ in ‘visual mental imagery’ to refer to a specific type of *experience* connected with the imagining, namely the presence of (quasi-perceptual) object imagery phenomenology, an experience not shared by all imaginers, or whether we want it to refer to a specific type of *content* of an imagining, e.g., an imagining involving the representation of visual information (how does the cat look?) rather than auditory information (how does the cat sound?), without demanding that the internal format of the representation is depictive or experienced quasi-perceptually.

If we follow Wittgenstein, we would opt for the second option, meaning that aphantasics can be said to be able to form visual mental images, since they are able to represent visual content in their (non)verbal behavior (e.g., by building token image descriptions based on their type imagery and knowledge, as outlined in 4.1.3). If we choose the second option, we would exclude aphantasics from the domain of ‘visual mental imagery’ but would be in need to find another way of referring to their ability to represent imaginative visual information.

A neuroscientist (but surely not every neuroscientist) might want to propose a third option, arguing that the neural correlate of object imagery phenomenology observed in visualisers, instead of the experience itself, is what we should refer to as ‘visual mental imagery’. However, if we are interested in what the term ‘visual mental imagery’ means to us, the everyday imagining agent, I would argue that referring to a neural correlate, at least outside of the fMRI scanner, misses the point. For while Wittgenstein would, most likely, not be opposed to the methods of contemporary neuroscience, he would warn us against the assumption that we could derive the meaning of a term by means of reference to the neural activation observed during an act of imagination, rather than by observing the *actual act* of imagining (cf. PI §376: “It might be found that the same thing goes on in my larynx and in his. [...] But then did we learn the use of the words [...] by someone’s pointing to a process in the larynx or the brain?”). Furthermore, as Stam et al. (2022) remark, “neuroscience mainly

studies individual subjects, isolated from their natural and social surroundings, and with a small range of possible movements” (p. 2), meaning that the very circumstances under which visual imagery can be investigated in the form of a neural activation pattern are dramatically different from the lively, active and dynamic contexts in which imagining occurs in the everyday outside world.

Thus, the form of mental imagery that is relevant *to us* occurs neither inside of our minds, as a subjective private experience, nor inside of our brains, in the form of the objectively observable neural activity correlated with the private experience, but instead in the interaction with other agents *in the world*, as it shows up, in its myriad different forms, every time when a specific task, and not just a visual imagery task in a laboratory, requires us to represent our imaginings, whatever that may concretely mean in the presenting context.

And that brings us to the most important question that the Wittgensteinian approach to aphantasia poses: *Does it matter that aphantasics cannot visualise?*

The answer that I want to give to this question, based on my previous considerations of both the phenomenological and the neuroscientific perspective onto mental imagery, is that it matters less than one (especially an avid visualiser or a hyperphantasic) might think. It surely does not matter as much as reading Aristotle, or the British Empiricists, or the early experimental psychologists would make us believe. Aphantasics are definitely not cognitively disabled and to even call the condition an impairment (neurologically or otherwise) would appear to be questionable.⁹⁵ Does it matter with respect to task performance? In some sense it does, but also not in the way that we would expect, as evidenced by the fact that aphantasics, perform with higher accuracy than visualisers on some (imagery) tasks. And, as I have shown, it does not matter behaviorally for a wide range of other tasks that seemingly involve visualisation, such as pretend play, giving token imagery level descriptions, solving everyday tasks such as the screwdriver task, externalising one’s imagination as part of a creative process (e.g., painting) or using one’s imagination in order to make associations.

The concepts that I have introduced throughout this chapter of the thesis, i.e., meta-imagination and type- and token-level imagery, and the three strategy categories that I have discussed, i.e., Internal Description, External Reference and Spatial Sense, all provide evidence that there is a very wide range of (imagery) tasks that aphantasics can successfully perform (if they are using the appropriate strategies). Furthermore, by making the underlying assumption of what I have referred to as the visualiser’s fallacy explicit, I have shown how any potential task can be analysed in order to see whether an aphantasic might be able to perform it, and that one of the most central questions that one ought to ask oneself in the process is “Would knowing how it would look like suffice in order to succeed on the task?”. Lastly, taking the Wittgensteinian perspective, i.e., following his definition of mental images, shows us that object imagery phenomenology is not the deciding factor for determining whether an agent can form a mental image. For the biggest merit of taking the Wittgensteinian

⁹⁵While I have argued in this thesis that aphantasia is not a neurological or a cognitive disorder, Monzel et al. (2022) recently published an article in which they argue that aphantasia does not meet the criteria for mental disorders, i.e., is not psychopathological, either.

approach is that it allows us to shift the focus on the agent's intersubjective behavior, rather than on their internal processes, observable or otherwise.

Nonetheless, since there is objective evidence, such as the binocular-rivalry task, showing that there are differences between aphantasics and visualisers on a sensory level, investigating the implications of these differences for the behavior and cognitive processes of both groups remains an important task. The current thesis is not arguing that there are no differences between aphantasics and visualisers, this would be de facto false. Instead, what I am arguing is that we should stop thinking of aphantasia in terms of 'impairment' or 'disorder' and should rather view it as an alternative way of cognizing the world, which may bring its unique advantages and disadvantages with it but which does not in any significant way keep the aphantasic from engaging in the everyday discourse.

5 Open Questions and Conclusion

This thesis has shown that for many everyday tasks, such as pretending to be a pirate, or answering semantic knowledge questions, the behavioural correlate of a (meta-imagining) aphantasic can be indistinguishable from that of a visualiser. However, we have also seen cases, such as mental rotation tasks, as well as episodic and working memory tasks, where there are detectable differences, on average, between the performances of the two groups. This suggests that aphantasics have a somewhat different cognitive profile than non-aphantasics, meaning that they possess a different set of skills that enables them to outperform the normal visualiser on some tasks, while falling short on others.

Future research should continue the investigation into the skill set of aphantasics, while paying close attention to whether, and if so how, specific types of strategies of aphantasics differ from those employed by both hyperphantasics and ‘normal’ visualisers. Crucially, it should be tested which visual imagery tasks actually require acts of visualisation and cannot be solved by means of knowledge, spatial imagery, etc. In this context, the imagery debate looms large. While this thesis has focused specifically on mental rotation and scanning tasks, there is decades-worth of experimental research and arguments regarding the (un)importance of depictive representations and our brief discussion of Pylyshyn’s and Kosslyn’s main arguments only scratches the surface.

While the imagery debate has been mentioned in passing in the discussion sections of some research papers on aphantasia, there is, to date, no comprehensive account that attempts at bringing it together with the contemporary literature on aphantasia, although the concept of meta-imagination, which is inspired in parts by Pylyshyn’s arguments in the imagery debate, might be seen as a first fruitful result of such an approach. The imagery debate may ‘over’, in the sense that most philosophers and cognitive scientists nowadays subscribe to the Kosslynian/Pearsonian pictorialist view, but we would be foolish to miss the importance that the results of the debate bear for our understanding of aphantasia, as well as for the relevance of the ability to visualise for our cognitive abilities in general. We might even propose to reinvigorate the imagery debate, by ushering in a new phase, where, instead of investigating whether sui generis depictive representations exist or not, we focus on which tasks *require*, or even benefit, from the use of such depictive representations, opposed to other, potentially propositional, media of representation and, importantly, for which tasks the use of depictive representations might even lead to worse performance.

While this investigation will be carried out in an experimental setting, another important suggestion that the Wittgensteinian approach makes is that we should also leave to laboratory and talk to aphantasics in the real world. And here, instead of merely asking them whether they can do this or that, we should ask how they experience aphantasia, how they think that it influences them or, more generally, what it *means to them*. An example of such an approach is the qualitative questionnaire assessing the personal experiences of and attitudes towards aphantasia that I have developed and administered to a group

of congenital aphantasics and which can be found in the Appendix. However, following the general suggestion to leave the laboratory and investigate aphantasia ‘in the field’, such questionnaires should, if possible, be administered in person, perhaps in the format of a semi-structured interview.

More generally, due to the importance of the intersubjective nature of mental imagery, aphantasia, next to being a subject of investigation in the field of (cognitive) neuroscience, should also be investigated in fields that focus on human behavior in communities, such as sociology or anthropology. For since these fields are characterised by their own methodologies, we can expect that they will provide us with insights that might be missed when viewing aphantasia from the (cognitive) neuroscientific point of view alone.

On a more philosophical note, our investigation into meta-imagination, and especially the type-token distinction with respect to imagery, opens up the important question of what mental imagery is like, conceptually speaking, for the ‘normal’ visualiser, i.e., an agent that is neither aphantasic nor hyperphantasic but ‘somewhere in between’. For, arguably, understanding the hyperphantasic’s imagery as a quasi-perceptual experience that is as vivid as real seeing, as well as viewing the imagery of aphantasics as purely conceptual, devoid of any quasi-experiential content, is more straightforward than understanding which form the imagery of a normal visualiser has. For example, is the normal visualiser’s imagery merely a less vivid version of the hyperphantasics imagery, or is it in some ways maybe even more comparable to aphantasic imagery, meaning that it is mostly conceptual? Is it quasi-perceptual with respect to some contents and conceptual with respect to others? Or is it perhaps wholly different from both aphantasic and hyperphantasic visual imagery experiences? In some sense, neither aphantasia nor hyperphantasia but ‘normal’ imagery is the real mystery.

Another important imperative for the future investigation of mental imagery and aphantasia, philosophical or otherwise, is to broaden our focus to include the imagery corresponding to the other, i.e., non-visual, sense modalities. In this context, Jan Stam suggested to me that, in the case of the bouncy ball task, an aphantasic (but also a normal visualiser) might solve the task by imagining hearing the sound of the imagined ball hitting the floor, instead of mimicking the eye-movements of seeing a ball falling down. This suggestion points us to the essential *multi-sensory nature* of imagery, and it opens important new questions, such as whether the imagining of a beach, say, by an aphantasic who only lacks the ability to visualise is still less conceptual and abstract than that of a total aphantasic, i.e., one who is unable to create quasi-perceptual experiences with respect to all sense modalities. For the former, but not the latter, has direct access to the token level of imagery with respect to all non-visual modalities.

Lastly, an interesting topic for further inquiry is the creative process of aphantasics, compared with that of both hyperphantasics and normal visualisers, both in the context of (visual) art and in the more general sense of generating novel solutions to existing problems, e.g., in the work philosophers or scientists. For here, the use of a token-based, opposed to a type-based, imagery style might have important implications for how the creative process is approached and for which kind of creative tasks which imagery style might be better suited.

Conclusion

This thesis investigated the condition of aphantasia, by attempting to answer two specific questions. The first question is why aphantasic individuals are not gravely cognitively impaired and even outperform visualisers with respect to some visual mental imagery tasks. The second question is why scientists and philosophers assumed that aphantasics would be cognitively impaired and unable to solve the tasks in question in the first place. In order to answer these questions, this thesis used an interdisciplinary approach, drawing both on historical philosophical arguments and contemporary experimental results.

With respect to the first question, I have argued that aphantasics, instead of visualising, are using alternative strategies, such as internal verbal descriptions, semantic knowledge, or spatial imagery, which, in many cases, can lead to behavior that makes it seem, to an outside observer, as if they are actually visualising. I have coined the phenomenon of acting as if one were visualising, without actually visualising, meta-imagination and I have shown that while aphantasics cannot actually visualise, their ability to meta-imagine, still allows them to participate in a wide range of practices that initially seem to require visualisation. Therefore, the answer to the first question is that aphantasics can solve the task in question, because these tasks do not require one to actually visualise but merely to represent visual information in a medium of representation.

With respect to the second question, I have argued that the assumption that aphantasics could not perform basic cognitive tasks, while it can be traced back all the way to Aristotle, is grounded in the biases of visualisers who, because they themselves have accompanying object imagery phenomenology during a range of cognitive tasks, falsely assume that the inability to experience such object imagery prevents the aphantasic from carrying out said tasks. I have referred to this false assumption as the visualiser's fallacy and have argued that one simple way of testing whether the visualiser's fallacy might apply to a task in question is to ask oneself whether knowledge of how an object or a state of affairs would look like would be sufficient to solve the task.

More generally, I have argued that, following Wittgenstein, the meaning of the term 'mental image' can neither be found by means of a phenomenological investigation of one's own private experiences 'in the mind', nor by means of a neuroscientific investigation of the neural correlates of such experiences in the brain. Instead, its meaning can only be determined by means of observation of the verbal and nonverbal practices into which the use of the term is woven, meaning that the question of whether aphantasics 'have' mental images, in turn, can only be answered by means of closely observing their behavior in the context of these practices and judging according to the rules of the respective language-games. And in this context, I have argued that, based on the available empirical evidence, one must conclude that aphantasics, although being unable to visualise, in the sense of the ability to create quasi-perceptual experiences, can form visual mental images, in the sense of representing visual information in a way that allows them to participate in a large variety of the relevant practices.

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6 Appendix

Aphantasia Questionnaire

In the process of writing this thesis project, I regularly visited the bi-monthly *Aphantasia community online meetings*, organised by aphantasia.com, in order to engage with the aphantasia community in a more direct manner. I wanted to understand how they describe their experiences with aphantasia and was especially interested in hearing their personal stories, leading from the moment of discovering that they had the condition until the current moment.

One of the insights I was able to gain from the anecdotes and self-descriptions shared by the community members was that there is a large variety between the members in almost every aspect other than the defining inability to voluntarily conjure up object imagery phenomenology. For example, some aphantasics state that they have a bad sense of orientation, struggle with their episodic memory or feel less emotional about other people when they are not present, while others do not share these experiences. Furthermore, some community members even described their condition as a sort of super-power, stating that it protects them from visually reliving traumatic experiences, enables them to move on quicker after break-ups, or helps them with mindfulness meditation.

After attending a couple of the community meetings, I decided that I wanted to give the aphantasia community an opportunity to be represented in my thesis project and therefore constructed a questionnaire that was specifically designed to assess the personal experiences of aphantasics. Furthermore, following a suggestion made by Michiel van Lambalgen, I also included a question about an everyday task that one might expect to require the ability to form visual imagery, namely finding the correct screwdriver to drive a specific screw into the wood of a cupboard wall (the task, as well as some of the answers given by the participants is discussed in detail in section 4.2.2).

Although the answers given to the aphantasia questionnaire, except for the screwdriver question, are not featured in the main text of the thesis project, I nonetheless wanted to make the raw data of the questionnaire accessible in the appendix, so that the reader who is interested to learn more about aphantasia has the opportunity to read the first-person accounts given by aphantasics about the condition. I take this idea to be very much in the spirit of Wittgenstein, who time and again stressed the importance of intersubjective exchange and the crucial role of the community in determining the meaning and use of words.

Methods

Participants. The study was advertised during the aphantasia community meeting on the 28th of January 2023 and also via a post on the Discord server of the aphantasia community. Eligibility for participation was based on an assessment by means of the VVIQ, which was administered to every potential participant at the beginning of the questionnaire. Participants with a VVIQ of 25 or lower were deemed eligible. Twenty four participants were deemed eligible

for participation, fifteen of which had a score of 16, the lowest possible score, and the mean VVIQ score of the sample was 17.125, with only one participant scoring at the eligibility limit value of 25 (no participants were excluded due to their VVIQ score).

Experimental procedure. The questionnaire was administered via the online research platform Qualtrix. All participants completed the questionnaire in the same order, answering first the demographic questions, then the VVIQ, and then the qualitative questions regarding their personal experiences with and attitudes about aphantasia, as detailed below.

Materials. *Demographic Questions.* Participants were asked to indicate their gender, age range, highest academic degree and current profession.

Imagery questionnaire. The *Vividness of Visual Imagery Questionnaire* (VVIQ; Marks, 1973) is a 16-item scale which assesses the participants' ability to form visual mental images, by asking them to visualise persons or scenes (e.g., "Visualise a rising sun.") and then rate the vividness of their mental images, by means of a 5-point scale ranging from 1 ("No image at all, you only 'know' that you are thinking of the object" to 5 ("Perfectly clear and lively as real seeing").

Qualitative Questions. In order to assess the participants' personal experiences with and attitudes about aphantasia, 11 questions were designed, one of which was the aforementioned screwdriver question. For each of these questions, participants were asked to write down their answers in full sentences into an answer box, without requiring them to meet a specific word or sentence count. Participants were asked whether they think that aphantasia affects their personal or professional life (e.g., "Does aphantasia have any influence on your working life?"), their self-concept (e.g., "Has identifying as aphantasic led to any [other] changes in your self-concept?"), or their cognition (e.g., "Do you think aphantasia has any influence on your thinking process?"). Furthermore, they were asked to share how they learned about aphantasia and to report on their initial and current attitudes about the condition (e.g., "What was your initial [emotional] reaction to finding out that other people have actual visual experiences when they are visualising?").

The whole questionnaire (exported as a pdf) can be viewed under the following link: shorturl.at/blzBT

Results

Raw data. The raw data gathered from the questionnaire can be found under the following link: shorturl.at/kHOQ7

Screwdriver question analysis. The analysis of the screwdriver question can be found under the following link: shorturl.at/rtOW4