

## **Lack of Imagination: individual differences in mental imagery and the significance of consciousness**

### **1. Introduction**

Ensclosed in the armchair, a philosopher of mind is liable to mistake an investigation of his or her own mind for an investigation of all minds. This mistake is arguably encouraged by our monolithic talk of ‘The Mind’, as in the ‘The Mind-Body Problem’ or ‘The Mind-Brain Identity Theory’. In contrast, psychologists have long studied individual differences in our mental capacities, particularly in the areas of personality and intelligence, but increasingly with respect to basic perceptual and cognitive functions (Kanai and Rees 2011). Such differences merit philosophical attention too. The philosophers of the ‘new wave’ represented in this collection should be philosophers of minds.

In this chapter, I focus on one particular individual difference and its potential philosophical significance. The difference concerns variation in visual mental imagery (and correlatively visual episodic memory). This variation is one of the most remarkable individual differences in psychology. At one end of the spectrum are super-imagers: subjects who profess easily to be able to bring scenes before their minds’ eyes with the apparent richness and vivacity of normal vision; at the other end are non-imagers: subjects who claim not to enjoy any genuine visual imagery whatsoever. Such variation is striking for at least two, no doubt related reasons. First, although one in forty (Faw 2009) or perhaps even one in ten (Abelson 1979) of us are non-imagers, most of us are wholly unaware of the extent, or even existence, of such disparities. Indeed, even when their attention is drawn to them, super-imagers often struggle to believe the reports of non-imagers, and vice-versa. Thus, in his pioneering investigation

into the subject, Galton writes of his astonishment on finding that ‘the great majority of the men of science to whom I first applied protested that mental imagery was unknown to them, and looked on me as fanciful and fantastic in supposing that the words “mental imagery” really expressed what I believed everybody supposed them to mean’ (1880, p. 302).<sup>1</sup> Second, despite a great deal of experimental work, few if any strong or systematic correlations have been uncovered between reported imagery and levels of performance even in tasks which intuitively implicate imagery, for example, Shepard and Metzler’s mental rotation tasks, Kosslyn’s visual scanning tasks, or standard recognition and memory tasks.<sup>2</sup> Again, as Galton writes, ‘men who declare themselves entirely deficient in the power of seeing mental pictures can nevertheless ... become painters of the rank of Royal Academicians’ (1880, p. 304).

Consider how baffling it would be if we were to encounter a community many of whom were blind but yet amongst whom there was almost no recognition of any significant variation with respect to sightedness. On the face of it, this is exactly how Galton discovered our own community to be with respect to imagery. With the case of blindness in mind, it is understandable that many psychologists and philosophers have been sceptical whether such reported differences in imagery are in fact genuine. Indeed, according to one common line of thought, the cost of taking subjective reports at face value is an implausible epiphenomenalism concerning mental imagery. After all, if those who lack imagery do no

---

<sup>1</sup> Galton’s work on mental imagery is summarized in his 1883/1907, pp. 57-128. See also James 1890 which credits Fechner with the initial recognition of ‘great personal diversity’ in imagery (vol. II, Ch. 18, pp. 50-51). It should be noted that Galton’s specific suggestion that ‘men of science’ are typically poor imagers is neither properly supported by his data nor likely true (see Brewer and Schommer-Aikins 2006).

<sup>2</sup> For mental rotation tasks see: Shepard and Metzler 1971 and Shepard and Cooper 1982. Thomas 2012 contains an excellent introductory supplement. For visual scanning tasks see Kosslyn 1973, Kosslyn et al. 1978, Kosslyn 1980, Finke and Pinker 1982 and Borst et al. 2006. See the next section for references to work on individual differences.

worse in objective tests typically regarded as implicating imagery, it is obscure how imagery earns its functional keep.

In what follows I explore this challenge, and thereby consider the real significance of taking individual differences in imagery seriously. I proceed as follows. In the next section, I develop the puzzle raised by the apparent lack of correlation between objective task performance in imagery tasks and reported imagery in terms of a dilemma which apparently faces us, a dilemma between what I call *inscrutability* and *epiphenomenalism*. In section three, I argue that the first step in any adequate response to this dilemma is to distinguish between two conceptions of imagery: between imagery in the *representational* sense, meaning underlying sub-personal representations of a putatively imagistic nature—the focus of the so-called ‘mental imagery debate’—and imagery in the conscious or *experiential* sense, meaning conscious personal-level episodes of imagining. Since subjective reports speak only to imagery in the second, experiential sense, this distinction partly resolves our dilemma. Faced with two subjects who perform equally on imagery tasks, yet differ dramatically in their reported imagery, we can credit both with similar *representational* imagery (avoiding epiphenomenalism) but allow for marked differences in their *experiential* imagery corresponding to their differing reports (avoiding inscrutability).

This cannot be the whole story, however. For there remains the apparently puzzling failure of conscious, *experiential* imagery to correlate with objective task performance. In light of this failure, it may seem that the import of individual differences in imagery is that *conscious* imagery does lack a useful function. Moreover, generalizing, we might conclude by adopting the increasingly widespread view that consciousness *per se* lacks a useful function, and is best conceived of as an evolutionary spandrel (e.g., Blakemore 2005). Sections four and five offer rejoinders to these two lines of thought. In section four, I argue that even if conscious

imagery does lack a useful function, nothing follows about the significance of consciousness *in general*. I demonstrate this by arguing that on one leading account of the significance of *perceptual* consciousness (namely as a condition of demonstrative thought), mental imagery could not share the same significance. In section five, I return to the question of the significance of conscious imagery. I argue that whilst objective data from mental imagery tasks do plausibly establish the presence or absence of imagery in the representational sense, it is not obvious that such data do settle the presence or absence of imagery in the experiential sense. Instead, the differences between conscious imagers and non-imagers may emerge only when we consider exclusively personal-level differences in the way in which imagers perform imagery tasks: differences in the personal-level genesis, justification, and self-understanding of their performances.

## **2. Individual differences in mental imagery: the dilemma of inscrutability or epiphenomenalism**

Questionnaire-based studies have repeatedly confirmed Galton's finding of substantial variation in reported imagery.<sup>3</sup> Despite this, many theorists have doubted that such reported differences accurately reflect underlying reality. Most forcefully and recently, Schwitzgebel (2011, Ch. 3) has argued that Galton's supposed discovery of large variation in imagery is a myth based on 'excessive optimism about subjective report' (p. 36). Schwitzgebel accepts that individual *reports* of imagery vary dramatically. What he disputes is the alleged link between such reports and what he calls 'underlying imagery experience' (p. 36).

---

<sup>3</sup> See studies based on Betts' (1909) Questionnaire upon Mental Imagery (QMI), revised by Sheehan (1967), and Marks' (1973) Vividness of Visual Imagery Questionnaire (VVIQ).

Schwitzgebel expresses antecedent scepticism concerning the existence of sizable individual differences in experience within normal human populations (for example, p. 133f.).<sup>4</sup> But we need not share that view to feel the force of Schwitzgebel's argument in the present context. The argument is simply this. If subjects really did differ in their 'underlying imagery experience', we should predict 'vast corresponding differences in performance on cognitive tasks involving imagery—differences comparable to that between a prodigy and a normal person or between a normal person and one with severe disabilities' (p. 44; cf. the discussion of blindness above). Such differences in performance are not found. Thus, we should conclude that underlying imagery experience does not vary much across individuals. As for their reports: many subjects are just wildly wrong about their own experience.<sup>5</sup>

Schwitzgebel devotes most of his attention to defending his argument's crucial premise that individual differences in visual imagery do not closely or systematically correlate with objective task measures, either in terms of basic task competence, or in terms of specific response patterns. This premise is the subject of a long-standing and live controversy, and Schwitzgebel (Ch.3, §v) provides an excellent review of the relevant literature, including a

---

<sup>4</sup> For criticism of Schwitzgebel on this score, see Humphrey 2011.

<sup>5</sup> For Schwitzgebel, this is part of a larger theme concerning the unreliability of naïve introspection. However, it is worth noting that even if we agreed with Schwitzgebel that underlying difference on a Galtonian scale were implausible, we would not need to blame introspection *per se*. Another possibility is that there is wide variation in our understanding of the *concept* of visual imagery (cf. Flew 1956, Thomas 1989). Thus, two subjects accurately introspecting the same kind of experience might differ as to whether they think such experience *counts* as visual imagery, just as, notoriously, two people might differ in their understanding of what counts as arthritis. Schwitzgebel shows awareness of this concern but, for reasons he doesn't make explicit, 'doubt[s] that the optimist about introspective accuracy can find much consolation' in it (2011, p. 53). These issues are closely connected to long-standing methodological concerns about imagery questionnaires which go back to Galton's own subjects (see Burbridge 1994, p. 461, and for more general discussion, e.g., Kaufmann 1981).

critical assessment of the most recent major review suggesting a weak positive correlation between task performance and reported imagery (McKelvie 1995).<sup>6</sup>

As Schwitzgebel brings out, well over a century since Galton's work launched a substantial programme of research into the functional correlates of individual differences in reported imagery, there is little conclusive evidence of such a correlation. Instead, what emerges is 'a disorganized smattering [of positive findings, with respect to what Schwitzgebel later calls 'a suspiciously desultory sprinkle of tasks', p. 51], with frequent failures of replication' (p. 48). Thomas offers a similar assessment, writing that 'most surprisingly and disappointingly ... virtually no sign of any correlation has been found between people's vividness ratings and their performance (speed or accuracy) in various visuo-spatial thinking and problem solving tasks, even though, subjectively, such tasks seem to depend on imagery' (2009, p. 450).<sup>7</sup> Many prominent imagery researchers make similar assessments of the literature.<sup>8</sup> As a result

---

<sup>6</sup> Schwitzgebel also lists subsequent studies of reported imagery and objective task performance from 1995-2009. Of these, Schwitzgebel notes that ten report a positive relationship, nine a 'mixed' relationship, and twenty-one no significant relationship. Since the publication of Schwitzgebel's book at least two further studies have been published: Nouchi 2011 reports a positive correlation; Palmiero et al. 2011 obtain mixed results.

<sup>7</sup> Thomas also comments that 'even where reproducible correlations have been found, it has often proven difficult to make much theoretical sense out of them' (2009, p. 450). His example is the fact that vivid imagers (as measured by Marks' VVIQ) appear to be *worse* than non-vivid imagers at recalling specific colour shades. Thomas is presumably referring to Heuer et al. 1986 and Reisberg et al. 1986. See also Reisberg and Leak 1987.

<sup>8</sup> Thus, Dean and Morris: 'little or no correlation has been found between measures based upon subjective reports of the conscious experiences of imagery and experimental tasks or spatial tests that are explained in terms of their use or manipulation of mental images' (2003, p.246). And Borst and Kosslyn: 'subjective ... ratings only sporadically predict performance in visuospatial tasks .... For example, researchers have found little or no correlation between rated vividness of imagery (using the Vividness of Visual Imagery Questionnaire, VVIQ, Marks, 1973) and the performance on spatial abilities tests' (2010, pp. 2031-2). See these papers and Schwitzgebel's chapter for references.

it is unsurprising that many have outright rejected any correlation between reported imagery and objective task performance, or simply turned their backs on subjective reports.<sup>9</sup> As Reisberg, Pearson, and Kosslyn remark, ‘negative results, showing no relationship between imagery self-report and performance with imagery tasks, are relatively common. As a result, roughly a century after Galton’s original publication, many cognitive scientists remain deeply sceptical about the value of these self-reports’ (2003, p. 150).<sup>10</sup>

My aim here is not to enter this fray. Instead, I want to consider what follows if there does indeed exist no strong and systematic relationship between reported imagery and objective task performance. Thus, in what follows, I propose to make this large and controversial empirical assumption in order to consider its broader implications.<sup>11</sup>

---

<sup>9</sup> Schwitzgebel cites: Ernest 1977, Richardson 1980, and Paivio 1986, p. 117.

<sup>10</sup> Reisberg et al. (2003) direct us to Katz (1983, p. 42), Kerr and Neisser (1983, pp. 213-4), and Kosslyn et al. (1985, p. 196). For discussion and further references see also Faw (2009, pp. 2-3) who quotes Levine et al. (1985, p. 391): ‘The objective abilities can be considered descriptions of the subjective phenomenon’. Chara and Verplank argue against the validity of Marks’ VVIQ precisely on the basis that, ‘If the construct validity is to be supported, we should expect ... better performance by self-reported “good imagers” than “poor imagers” on a test of pictorial recall’ (1986, p. 916).

<sup>11</sup> This assumption substantially oversimplifies the empirical picture. One important issue is that imagery is a complex multi-component process. For instance, there may be separate spatial and object-based processes (Kozhevnikov et al. 2005), as well as many distinct processes involved in generating, manipulating, inspecting and maintaining imagery (Kosslyn 1994, esp. Ch. 9-10). Traditional imagery questionnaires thus plausibly fail to distinguish the processes involved in different tasks, and better questionnaires may yet reveal significant relationships between introspected imagery and performance on different tasks (see Dean and Morris 2003, and Kosslyn and Borst 2010). Moreover, some of the processes at work in standard imagery tasks are likely not exclusively visual. This raises the possibility that certain tasks are solved by ‘non-imagery’ using non-visual but nonetheless imagery-based strategies, e.g., haptic or motor imagery strategies, perhaps exploiting a common spatial code. For relevant background empirical discussion see Reisberg et al. 1986, Heuer et al. 1986, Slee

Granting this assumption, let us return to Schwitzgebel's argument against the existence of large individual differences in imagery. Its crucial move has undoubted appeal.<sup>12</sup> It is the claim that subjective differences will be closely mirrored by differences as measured by objective methods: methods, as Schwitzgebel puts it, 'in which success or failure on a task depends on the nature of the subject's imagery' (2011, p. 43). In short, it is the demand that our reports be backed up by action (or lack of it)—a demand naturally associated with neo-behaviourist, broadly functionalist or interpretationist, views in the philosophy of mind.

On the other hand, the view that many of us consistently produce dramatically inaccurate reports about our own conscious experience is not appealing. Schwitzgebel himself is notoriously happy to embrace such a view about all aspects of our conscious lives (see his 2011, *passim*). However, despite disavowing any commitment to a particular conception of introspection (p. 120), Schwitzgebel's sanguinity here arguably betrays a commitment to a questionable model of introspection. In particular, Schwitzgebel talks of 'the mechanisms' of introspection, and of introspection as a 'method [better: 'a pluralistic confluence of processes'] by which we normally reach judgments about our experience' (p. 120). Such claims may seem innocuous, but they allow Schwitzgebel to think of the mechanism(s) of introspection as breaking down, as being variously 'misleading', 'faulty' and 'untrustworthy' (p. 129), and perhaps ultimately as being simply broken, leaving us cut off from our stream of consciousness.

---

1980, and also the literature on imagery in the congenitally blind, for example, Marmor and Zaback 1976, Carpenter and Eisenberg 1978, Kerr 1983, Zimler and Keenan 1983.

<sup>12</sup> Schwitzgebel notes similar arguments go back at least to Angell 1910.



This last view seems to be that of Marks, who suggests ‘that non-imagers suffer from some sort of sub-clinical neurological disconnection syndrome that somehow makes them unable to report on, or form verbal memories about, images that they nevertheless, in some sense do experience’.<sup>13</sup> What is so hard to understand about such a view is what it would mean for a non-imager to (in any sense) *experience* imagery, and yet that imagery to be entirely inaccessible to her, for her to be entirely ‘disconnected’ from it. It is not of course hard to understand our making mistaken judgments about our conscious life from occasion to occasion. What is arguably incoherent is the idea that the layout of a subject’s consciousness might be a certain way, and yet that layout seem a quite different way—or no way at all—from the subject’s own point of view (for expressions of this kind of viewpoint see Dennett 1991; Shoemaker 1994; Chalmers 1996, p. 196f.; and Martin 2006, §7). In Shoemaker’s terms, what is incoherent is that we be *self-blind*: constitutionally incapable of responding reliably to our own experience. After all if an experience is outside the ken of its own subject, it is hard to understand in what sense we should think of it as conscious. In what sense does it contribute to the *subjective* life of the individual (cf. Nagel 1974)?

As I say, there is nothing incoherent about our making mistakes our conscious lives. And one might interpret Schwitzgebel as simply insisting that such mistakes are extremely frequent. But in the present context we want some explanation of why apparently attentive and rational subjects consistently make the same mistakes about their inner lives. A perceptual model of introspection (cf. Shoemaker 1994) licenses such a possibility, since with a mechanism at hand we can think of it as fragile. But such a model also licenses the apparently incoherent idea that we could be completely cut off from our conscious life. If we reject a perceptual model, however, we must grant that non-imagers are in a position to know about their

---

<sup>13</sup> This is how Thomas (unpublished) describes the view of Marks (1986, p. 237). Compare discussions of Anton’s syndrome, and anosognosia more generally.

imagery but for some reason fail to exploit that position. Here it seems reasonable to ask for explanation. And no such explanation is forthcoming. Indeed, Schwitzgebel wants to insist that we ‘make gross, enduring mistakes about even the most basic features of our currently ongoing conscious experience, *even in favourable circumstances of careful reflection*’ (p. 119, my emphasis), and that such mistakes are *not* merely the result of being ‘distracted, or passionate, or inattentive, or self-deceived, or pathologically deluded’, and do not occur only ‘when we are reflecting about minor matters, or about the past, or only for a moment, or when fine discrimination is required’ (p. 118).<sup>14</sup>

More could certainly be said here but enough has been said to motivate the search for an alternative to inscrutability. Yet, as we have seen, accepting subjects’ reports at face value and avoiding inscrutability comes at the apparently severe cost of embracing epiphenomenalism (here meaning: ‘no functionalism’) about imagery. For if large variations in imagistic experience obtain without being reflected in performance in imagery tasks, it is hard to resist the conclusion that this is because imagery is of little or no use in such tasks. At its simplest and most extreme, the cost is of accepting that visual imagery has *no* cognitive consequences beyond our reports on its existence. Striking as it is, such a view has found adherents. Winch (1908) makes the argument with refreshing directness. First, by appeal to his own case; arguing that he has no mental images but is far from intellectually inferior, so mental images can’t perform the functions they are supposed to—they may even be a

---

<sup>14</sup> In fact, is not just that Schwitzgebel gives us little clue as to *why* the relevant population should be so strongly and consistently committed to enormous mistakes about their inner lives. Schwitzgebel does not explicitly indicate *who* he thinks is wrong, that is what a ‘normal’ stream of conscious imagery consists of. It is most natural to think that his view is that we all have some modest degree of imagery and so error is especially pronounced amongst professed super-imagers (since they do no better than ‘normal’ imagers) and professed non-imagers (since they do no worse).

hindrance. Second, by appeal to experimental evidence from Thorndike (1907) and his own studies, both of which find no correlation between reports of vividness and performance on a memory task.<sup>15</sup> Winch imagines a contemporary Schwitzgebel retorting to him, ‘If you were capable of proper introspection, you would find these images you say you are without’ (1908, p. 342). He is entirely unmoved.<sup>16</sup>

Schwitzgebel makes the natural objection to epiphenomenalism, namely that it ‘seems to posit a major faculty with a fairly obvious range of purposes but in fact with little purpose at all, and little effect on behaviour apart from the power to generate reports’ (2011, p. 51). In short, we seem faced with an unappealing choice between inscrutability and epiphenomenalism, a choice of either denying that subjects have access to their own imagery, or of denying that imagery plays any useful function. As Heuer et al. (1986) nicely summarize the dilemma: ‘there are many reports of no relation between performance and imagery self-report. This suggests that either the differences in imagery report are misleading about the underlying experience, or that the differences in experience do not have functional implications’ (1986, p. 162).

In the next section, I argue that the first step in navigating between the horns of this dilemma is to distinguish between imagery in the *representational* sense, referring to underlying sub-personal representations of a putatively imagistic nature, and imagery in the *experiential*

---

<sup>15</sup> For this reference and several others I am much indebted to Thomas unpublished, as well as to his hugely helpful 2012.

<sup>16</sup> Although clear advocates of the ‘no function’ view are thin on the ground, the issue was the source of a heated controversy in scientific circles a century ago. In addition to Thorndike and Winch, see Fernald (1912, pp. 135-8). There is also the infamous case of the behaviourist Watson who seems to have been motivated to deny his own mental imagery declaring imagery ‘a mental luxury (even if it really exists) without any functional significance’ (1913, p. 175). For discussion see Faw 2009, pp. 7-10 and Thomas 2012.

sense, referring to conscious personal-level episodes. Since subjective reports speak only to imagery in the second, experiential sense, where objective performances match there is no reason not to explain those performance in terms of matching underlying representations.

Our puzzle then exclusively targets the mismatch between conscious imagery and task performance. This puzzle is taken up in sections four and five. In section four, I argue that even if we should conclude that conscious imagery lacks significance, this need not imply that consciousness *in general* lacks substantial significance. I demonstrate this by arguing that on one leading account of the significance of perceptual consciousness (namely as a condition of demonstrative thought), mental imagery could not share that same significance. In section five, I argue that whilst objective data from mental imagery tasks do plausibly establish the presence or absence of imagery in the representational sense, it is not obvious that such data do in fact settle the presence or absence of imagery in the experiential sense. Instead, I argue that the significance of conscious imagery may emerge only when we consider exclusively personal-level differences in the way in which imagers perform imagery tasks: differences in the personal-level genesis, justification, and self-understanding of their performances.

### **3. Two conceptions of imagery**

Many theorists insist that mental imagery is *by definition* a form of conscious experience.<sup>17</sup> If imagery is by definition conscious, then we seem to be directly driven onto the dilemma of

---

<sup>17</sup> For example, Marks writes, 'Imagery, by definition, is a mental experience and verbal reports therefore provide a necessary, albeit fallible, source of evidence.' (1983, p. 245). See also Richardson 1969. Thomas 2012 also mentions: McKellar 1957 and Finke 1989.

inscrutability or epiphenomenalism. Professed non-imagers must either be wrong about their inner lives, or their imagery must serve no function in relevant tasks: not being itself a step in the process of solving the task but rather, as Neisser puts it echoing Watson, ‘a kind of cognitive “luxury,” like an illustration in a novel’ (1967, p. 157). Plausibly commitment to this connection between consciousness and imagery is a major impetus towards such views.

Others, however, have suggested that there is a perfectly respectable notion of imagery shorn of its implication of conscious awareness.<sup>18</sup> From an objective perspective, one obvious reason to ascribe imagery is because subjects exhibit certain patterns of response in various tasks. As already noted, in the field of imagery research two of the most famous tasks are mental rotation tasks and visual scanning tasks. What we observe in such tasks is a certain pattern of response, a pattern we then explain by hypothesising representational structures, which by dint of their functional and structural features we might think of as imagistic. For example, data from visual scanning tasks concerning the linear correlation of reaction time and represented distance are held to evidence imagistic representations since ‘one of the defining properties of [an imagistic] representation is that metric distances are embodied in the same way as in a percept of a picture’ (Kosslyn et al. 1978, p. 53).

Whether such representations are in fact imagistic in format is the issue at the heart of the mental imagery debate of the seventies and eighties (see Kosslyn 1994, Ch. 1 for an

---

<sup>18</sup> An early example is Neisser 1970 who proposes a distinction between ‘imagery as an experience’ and ‘imagery as a process’. Thomas 2012, whom I follow here, puts the distinction in terms of *experiential* and *representational* notions of mental imagery. Thomas himself does not endorse the distinction and indeed elsewhere suggests that ‘It is of the very nature of imagery to be conscious’ (2003, §3.3). As Bence Nanay pointed out to me, a notion of imagery which does not imply conscious awareness is plausibly at play in van Leeuwen 2011, as well as explicitly in Nanay 2010.

overview). However, as many have observed, this debate is a debate about underlying representations and not about the nature of conscious mental imagery *per se* (Tye 1991 emphasizes this point).<sup>19</sup> Imagery in this representational sense is clearly not conscious by definition. It may be that such representations sub-serve conscious imagery wherever it is found (that is such representations may be an empirically necessary condition of experiential imagery) but we need not think that such representations are sufficient for experiential imagery. As a result, the fact that someone does not report conscious imagery does not militate against crediting that subject with imagery in the representational sense. For we are crediting them with sub-personal informational structures intended primarily to explain behavioural patterns. The nature of these representations (that is: what can be inferred about them from the relevant behavioural, and of course increasingly neuroimaging data) is an empirical question. There is no question of subjects being positioned to know about such representations just in virtue of having them.

What subjects report, on the other hand, are conscious episodes of imagining. Arguably, such episodes cannot continue to exist entirely outside their subject's ken. Consequently, if a rational and attentive subject honestly denies having imagery, that *does* militate against ascribing conscious imagery to them. Thus equipped with the distinction between representational, and experiential or conscious imagery, a resolution of our earlier dilemma suggests itself. For we might hope to avoid inscrutability by granting that non-imagers lack 'conscious imagery' as they say, whilst still crediting their task performances to imagery in the representational sense, thereby avoiding epiphenomenalism (cf. Kosslyn et al. 1978, p. 53).

---

<sup>19</sup> That said, one's own conscious mental imagery may bias one's position in the debate (Reisberg et al 2003).

This picture is very attractive. It also goes some way towards explaining our initial puzzlement as to why large individual differences in imagery seemingly go unnoticed. The partial answer here is that large differences in experiential imagery are consistent with matched task performances underlain by similar representational imagery. In this way, ordinary non-imagers should not be thought of on analogy with the blind but with idealized blindseers (see §4 below). However, as this last remark suggests, merely distinguishing between experiential and representational imagery does not get to the root of matters. For even accepting the resultant picture of individual differences, we still face the challenge that *conscious* imagery is epiphenomenal, in the sense of serving no clear function beyond prompting reports on its existence.<sup>20</sup>

Schwitzgebel presses the concern as follows.

Unless conscious experience is epiphenomenal, people whose imagery is mostly conscious ought to perform somewhat differently on cognitive tasks than people whose imagery is largely unconscious, and thus it remains strange that such differences have not been found. Maybe consciousness *is* epiphenomenal, or at least largely so, but such a view faces the challenge of explaining why whatever biological or functional facts permit some cognitive processes but not others to be conscious seem to have so few other ramifications. (2011, p. 51)<sup>21</sup>

---

<sup>20</sup> Having made his distinction between imagery as experience and imagery as process, Neisser seems happy to embrace this consequence.

<sup>21</sup> Schwitzgebel also argues that resolving the puzzle of individual differences along the lines developed in this section will force us to think of everyone's underlying imagery (conscious or not) as equivalent in detail to that reported in 'the grandest self-assessments'. But if that were so, Schwitzgebel suggests that 'it is surprising that we don't all perform substantially better on mental rotation tasks, visual memory tasks, and the like' (2011,

In the remaining two sections I confront this concern directly. I do so by challenging two common presumptions, both implicit in the passage just quoted. First, in section four, I argue that even if one doubts the significance of conscious imagery, this does not imply that consciousness *in general* lacks substantial significance. I demonstrate this by arguing that on one leading account of the significance of perceptual consciousness (namely as a condition of demonstrative thought), mental imagery could not share the same significance. Finally, in section five, I propose that the significance of conscious imagery may *not* be appropriately measured by objective performance in imagery tasks. I thereby undermine the case for the insignificance of consciousness even in the imagistic case.

#### **4. The significance of consciousness**

The general question of the significance of consciousness is often raised with reference to cases of blindsight (Weiskrantz et al. 1974, Weiskrantz 1997). Subjects with blindsight, a condition caused by damage to, or removal of, some portion of primary visual cortex, lack conscious awareness in regions of their visual field corresponding to the damaged regions of their retinotopically mapped cortex. Despite this lack of awareness, such subjects can be prompted to make highly reliable guesses about certain features in their blind field (for

---

p. 51). This objection is problematic. The grandest self-assessments typically compare imagery to ordinary perception. In this light, we ought to ask: how well should we expect subjects to do in rotation or memory tasks equipped with imagery as rich as perception? Yet then we need to ask: how rich is that? This is a famously controversial issue, an issue where the gap between our objective capacities (for example, in short-term recall, discrimination and identification tasks) and self-descriptions of richness is highly disputed. Arguably, then, no distinctive issue about imagination arises here.



example, the orientation, location or colour of a stimulus). Following Block, we can imagine a hypothetical blindseer being trained ‘to prompt himself at will, guessing what is in the blind field without being told to guess’.

The super-blindsighter spontaneously says ‘Now I know that there is a horizontal line in my blind field even though I don’t actually see it.’ Visual information from his blind field simply pops into his thoughts ... without having any perceptual experience of it. The super-blindsighter himself contrasts what it is like to know visually about an ‘X’ in his blind field and an ‘X’ in his sighted field. There is something it is like to experience the latter, but not the former, he says. It is the difference between *just knowing* and knowing via a visual experience. ... the content that there is an ‘X’ in his visual field is [access]-conscious but not [phenomenally]-conscious. (1995, p. 233)

Block supposes here that the hypothetical super-blindseer has a capacity for *knowledge* about aspects of his environment, knowledge sub-served by a (damaged) visual system, but not sourced in conscious perceptual experience. The alleged possibility of super-blindsight prompts the question: if such knowledge can be available in the absence of perceptual experience, what is the distinctive role of perceptual experience, if any?

There are at least two ways in which we might question the coherence of Block’s hypothetical case. We might argue that ‘if a patient could be trained to treat blindsight stimuli as self-cuing or prompting, this would amount to restoring the patient’s consciousness of events in their scotoma, the only remaining difference between such experience and normal vision being the relative poverty of the content’ (Dennett 1995, describing his 1991, pp. 332-

43).<sup>22</sup> Alternatively, we might argue that it is illegitimate to credit the super-blindseer with environmental *knowledge* because of their failure to possess internalist reasons—reasons either identical to or provided by conscious perceptual experience (cf. Smithies, this volume).

A more concessive approach is to accept both that the blindseer lacks conscious awareness of their blind field *and* that they can come to have knowledge of the relevant portion of their environment, but insist that there remains a difference between the kind of knowledge blindseers are capable of acquiring concerning their blind field and the kind of knowledge we ordinarily acquire through perceptual experience. An appealing suggestion here (developed most fully in Campbell 2002) is to think of the blindseer as incapable of acquiring *demonstrative* knowledge of the items in her environment. As Roessler puts it, ‘We can imagine a blindseer who has learned to exploit blindsight to verify existentially quantified propositions, such as “the object in my blind field is yellow”. But no amount of training [except presumably insofar as the training restores sight] will enable her to think of the object as “that lemon”’ (2009, p. 1035).<sup>23</sup> My interest here is not in defending this proposal. My interest is rather in showing that, *if* a proposal along these lines is right, then perceptual and imagistic consciousness are importantly *disanalogous*. This disanalogy allows us to credit perceptual consciousness with a significance that imagistic consciousness lacks, and so to

---

<sup>22</sup> Note that Dennett construes Block’s case here in a very particular way, describing the *stimuli* as self-cuing, as opposed to the super-blindseer as self-prompting. Block’s super-blindseer, at least as initially described, does not know to self-prompt *whenever something interesting appears in his scotoma* but, apparently, must constantly be prompting himself along all the dimensions that he is capable of guessing about. These are very different situations.

<sup>23</sup> As with other examples in this literature (for example, Marcel’s thirsty subject who fails to reach for a glass of water located in their scotoma) we have to allow poetic license: ordinary blindseers lack the form perception to identify lemons (and glasses of water). But ‘that thing’ or ‘that shape’ will do.

resist any inference from the putative insignificance of conscious imagery to a more general claim about the insignificance of consciousness in general.

To begin, note that non-imagers are naturally compared to subjects with super-blindsight. The comparison is misleading in various ways, and I do not mean in making it to suggest that non-clinical non-imagers can straight-forwardly be compared to rare clinical cases of so-called ‘blind imagination’.<sup>24</sup> But one similarity between the non-imager and the super-blindseer is salient, namely that both can successfully prompt themselves to answer various questions of a kind which ‘normal’ subjects answer by reference to their conscious experience. The super-blindseer can prompt themselves successfully to answer various questions about their environment in the absence of perceptual experience. The non-imager can prompt themselves successfully to solve various imagery tasks (e.g., determine the congruence or incongruence of two Shepard figures) in the absence of imaginative experience. The responses of non-imagers can be highly reliable across a range of features: as we are assuming here, they are as reliable as those of imagers.<sup>25</sup> So we are led to ask: what role does conscious imagery have to play?

In the case of blindsight two initial answers were forthcoming. First, there was Dennett’s suggestion that, in virtue of subjects being able to achieve knowledge via self-cuing, their

---

<sup>24</sup> On which see Zeman et al. 2010. What Zeman et al. call ‘blind imagination’ apparently involves the ‘successful use of an alternative strategy to perform imagery tasks in the absence of the experience of imagery’ (2010, p. 145). One piece of evidence for this is that their subject does *not* exhibit the standard reaction time effect in the mental rotation task. Above I assumed (acknowledging the size of this empirical assumption) that this is not true of professed non-imagers.

<sup>25</sup> This is one major disanalogy between non-imagers and *ordinary* blindseers, though one that is hardly surprising given the fact that imagery substantially involves visual processing areas which are presumably intact in sighted, non-clinical non-imagers.

sight is restored. This approach to individual differences in imagery would in effect be to deny the existence of such differences (and so embrace inscrutability), for non-imagers do unthinkingly self-cue when asked to respond in imagery tasks yet deny that they have imagery. Second, there was the idea that blindseers lack knowledge because of the absence of internalist reasons. This approach to individual differences would deny that non-imagers can be said to know facts about, for example, the congruence of Shepard figures, since lacking conscious reasons for making that judgment. Whatever one's intuitions about blindsight, in the case of imagery the implausibility of this verdict given suitably reliable performance in the task tells against this approach.

In the case of blindsight, a more concessive third answer emerged, namely the hypothesis that what blindseers lack is the capacity for acquiring *demonstrative* knowledge of (and so demonstrative reasons for acting on) particulars in their environment. In the case of the imagination, however, the analogous suggestion cannot provide a substantive explanatory role for conscious imagery. The reason is that conscious imagery does not introduce new particulars to the mind. Perceptual imagination is a faculty of *re*-presentation and *re*-combination. Insofar as particulars can be imagined, it is because they have previously been encountered in perceptual experience. Thus, in any case of conscious imagery the possibility of demonstrative thought about an individual will already have been secured in perceptual experience if it is a possibility at all. Non-imagers, who have enjoyed the same kinds of perceptual experience, will thus be in no worse a position to think demonstratively about perceptually encountered particulars even though they cannot imagine them. They are already enabled to think about such particulars, and so the renewed presence before the mind of the particulars in imagination has no explanatory work to do.

It may seem that we *can* imagine particulars that we have not previously encountered in perceptual experience. However, it is more plausible to think that we are able to recombine features we have previously experienced in a purely general way. Thus, in the absence of prior perceptual acquaintance, there will be no possibility of our imagining qualitatively identical but numerically distinct individuals across imaginative episodes, independent of a stipulative act of propositional imagination. Similarly, there will be no possibility of imagining one but not the other of two identical twins, neither of whom one has perceptually encountered, independent of an act of stipulative imagination. In short, conscious imagery never serves to enable demonstrative reference not already enabled by perceptual experience. A plausible account of the explanatory role of conscious experience in relation to *perception* is thus not available as an account of the significance of conscious *imagery*. The absence of a significant explanatory role for conscious imagery can now be seen to be consistent with a significant explanatory role for conscious perceptual experience. In consequence, even if we refuse to recognize a useful function for conscious imagery, it will not follow that consciousness *in general* lacks significance. In the next and final section I return to the antecedent of this conditional, namely the issue of whether we really should think of conscious imagery as lacking a useful function.

## **5. Where to look for the significance of conscious imagery**

If imagers and non-imagers do not differ in their success at imagery tasks, and furthermore if they succeed because they share the same underlying representations which may be imagistic in format, how *do* imagers and non-imagers differ? Of course, imagers report their imagery. But they do not merely report their imagery. They think of themselves as summoning, manipulating and inspecting imagery, and of their doing so as prompting and grounding their

task successes.<sup>26</sup> When an imager is asked how she knew that the first figure was incongruent with the second, she will answer by saying that she knew because she formed an image of the first figure, rotated it in her mind's eye, and found it didn't line-up with the second. She thus takes her imagery to explain and justify her answer.

In contrast, the non-imager will tell no such story. When a non-imager is asked how he came to his answer, he will presumably answer along the lines that he 'just did'. The non-imager's story, disclaiming reason and (internalist) justification for his response, is a commonplace in many contexts. Asked what you ate for dinner last night you might be fully capable of forming a detailed episodic memory of the delicious meal, but you may nonetheless simply answer straight-off without bothering. Asked whether a certain person was at a party last week you might answer that she was, despite being entirely incapable of forming a visual (or more generally perceptual) memory of her. Similarly, we often tell the time, answer basic arithmetic puzzles, or solve simple anagrams without being able to say any more about how we reached the answer other than that it just came to us, or popped into our heads.

What this reveals is that whilst matched success at an imagery task may implicate the very same underlying sub-personal information processing story with respect to representational imagery, it may mask a marked contrast between two quite different accounts of a subject's personal-level psychology. On the first account, a desire to answer a certain question leads the subject to engage in a certain complex imaginative activity the product of which is in turn taken to provide and justify an answer to the question. On the second account, a desire to answer a question yields an answer directly, an answer which the giver cannot justify (except indirectly). In terms of task success both stories are in one sense alike: the same answers are

---

<sup>26</sup> Cf. Shepard and Metzler 1971, pp. 701-2 and Kosslyn et al. 1978, p. 47, 51, though Kosslyn et al. in particular suggest that such introspective reports should be treated with scepticism.

arrived at. And insofar as the pattern of answers and response times is the same it is plausible that a shared information processing story is implicated. However, there is a crucial difference between the stories when it comes to the existence and availability of reasons and self-understanding.

Such differences in the availability of reasons will, according to some theorists, entail substantial epistemological differences. For example, whilst on a reliabilist or other suitably externalist picture, the non-imager may well count as knowing the relevant answer in a given imagery task, on the kind of internalist or ‘phenomenal mentalist’ view defended in Smithies (this volume), it is questionable whether the non-imager does know the answer since lacking a phenomenally-based justification. However, even if we are sceptical of insisting that the reliable non-imager does not know, it is clear that there is an important cognitive difference which needs marking between the imager who understands how they reach their answer from the inside, and the non-imager who does not.

If this is the right way to think about the key difference between imagers and non-imagers, the difference is not merely at the level of verbal report. The difference is in the presence and availability of reasons. In this light, we can see that there is an ambiguity in Schwitzgebel’s claim that ‘people whose imagery is mostly conscious ought to perform somewhat differently on cognitive tasks than people whose imagery is largely unconscious’ (Schwitzgebel 2011, p. 51). In one sense, people whose imagery is mostly conscious do not perform very differently: the experimentalist records the same pattern of answers in the relevant tasks. In another sense, however they *do* perform very differently. For, considered at the personal-level, the performances of the imager and non-imager are grounded and justified in fundamentally different ways. Insofar as we care only about task-performance in the first, ‘objective’ sense, conscious imagery is a ‘cognitive “luxury”’ (Neisser 1967, p. 157). But as can be seen by

considering the differences in performance in the second sense, conscious imagery is no more an epiphenomenon than the icing on the proverbial cake. Both may lack value from a certain task-focused or nutritional perspective, but both clearly have significance from a broader cognitive or hedonic perspective respectively.<sup>27</sup>

An important issue for investigation is the geography of this broader cognitive perspective. This is a task suited in part for philosophical investigation, as already clear from the brief mention made above of disputes concerning internalism and externalism, and the connection between reasons and knowledge. Another dimension along which to consider the wider significance of conscious imagery is in the *affective* lives of subjects. Imagers are likely to think of their capacity for conscious imagery as the potential source of positive and negative affect, for instance in fantasy and fearful apprehension. Relatedly, there are obvious differences between the ways in which non-imagers and imagers relate to the past, given the essential involvement of imagery in conscious episodic memory. (Though these differences need not emerge in tasks which only test whether the subject can answer certain factual questions about the past.) Possibly reflecting both these themes, there is some evidence of correlations between aversions and vivid imagery (Dadds et al. 2004), and between posttraumatic stress disorder and vivid imagery (Jelinek et al. 2010). This is not the place to explore these matters. What needs underlining here is that there is a potentially rich

---

<sup>27</sup> It may still be objected that since the answers given are caused for both imager and non-imager by the same underlying representations, any role for conscious imagery is screened-off. However, this objection assumes that we treat two answers as the same just when they are scored similarly by the experimentalist. As discussed, whilst this might be an entirely reasonable perspective to take as an experimentalist, it is not the only perspective, and it is not the subject's natural perspective. From the subject's perspective, there is a fundamental difference between an answer which is internally justified and one which is simply reliably produced by a sub-personal mechanism. If we focus on the probability of an *internally justified answer*, conscious imagery is not screened off by the presence of representational imagery.



psychological landscape of differences between those possessed of conscious imagery and those lacking it to explore once we look beyond the narrow confines of mental imagery tasks.

## 6. Conclusion

I began with a puzzle concerning the apparent lack of correlation between objective task performance in imagery tasks and reported imagery. In response to this puzzle I made three key suggestions. First, I proposed that we distinguish between *representational* and *experiential* (i.e. conscious) imagery, crediting all those who produce a certain pattern of task responses with representational imagery, but crediting only professed imagers with experiential imagery. Second, I argued that, even if we take the lack of correlation between experiential imagery and task performance to show that experiential imagery lacks significance, it does not follow that consciousness in general does. To show this I appealed to one putative role for perceptual consciousness (namely as a condition of demonstrative thought) which could not be a role for imagistic consciousness. Finally, I questioned whether we should in fact conclude that experiential imagery lacks significance on the grounds that it does not correlate with task performance in imagery tasks. Against this, I suggested that the significance of experiential imagery may be found only when one considers a subject's performance from their own point of view, in terms of their reasons, justification and understanding of it.<sup>28</sup>

---

<sup>28</sup> I'm very grateful to comments and questions from Justin Fischer, Anil Gomes, Liz Irvine, Nick Jones, Rory Madden, Mike Martin, Bence Nanay, Robert O'Shaughnessy, Declan Smithies, Mark Sprevak, Lee Walters, and (as always and especially) to Hanna Pickard.

## References

- Abelson, R. P. 1979. Imagining the purpose of imagery. *Behavioural and Brain Sciences* 2: 548-9.
- Angell, J. R. 1910. Methods for the determination of mental imagery. *Psychological Monographs* 13: 61-108.
- Betts, G. H. 1909. *The Distribution and Functions of Mental Imagery*. New York: Teachers' College, Columbia University.
- Blakemore, C. 2005. In celebration of cerebration. *Lancet* 366(9502): 2035-2057.
- Block, N. 1995. On a confusion about a function of consciousness. *Behavioral and Brain Sciences* 18(2): 227-47.
- Borst, G. and Kosslyn, S. M. 2010. Individual differences in spatial mental imagery. *Quarterly Journal of Experimental Psychology* 63: 2031-2050.
- Borst, G., Kosslyn, S. M., and Denis, M. 2006. Different cognitive processes in two image-scanning paradigms. *Memory and Cognition* 34: 475-490.
- Brewer, W. F., and Schommer-Aikins, M. 2006. Scientists Are Not Deficient in Mental Imagery: Galton Revised. *Review of General Psychology* 10: 130-146.
- Burbridge, D. 1994. Galton's 100: An Exploration of Francis Galton's Imagery Studies. *British Journal for the History of Science* 27: 443-463.
- Campbell, J. 2002. *Reference and Consciousness*. Oxford: OUP.
- Carpenter, P. A., and Eisenberg, P. 1978. Mental Rotation and the Frame of Reference in Blind and Sighted Individuals. *Perception and Psychophysics* 23: 117-124.
- Chalmers, D. J. 1996. *The Conscious Mind*. Oxford: OUP.

Chara, P. J. Jr. and Verplanck, W. S. 1986. The Imagery Questionnaire: An Investigation of its Validity. *Perceptual and Motor Skills* 63: 915-920.

Dadds, M., Hawes, D., Schaefer, B. and Vaka, K. 2004. Individual differences in imagery and reports of aversions. *Memory* 12(4): 462-466.

Dean, G. M. and Morris, P. E. 2003. The relationship between self-reports of imagery and spatial ability. *British Journal of Psychology* 94(2): 245-273.

Dennett, D. C. 1991. *Consciousness Explained*. New York: Little Brown.

Dennett, D. C. 1995. Commentary on Block's 'On a Confusion about a Function of Consciousness'. *Behavioral and Brain Sciences* 18(2): 252-53.

Ernest, C. H. 1977. Imagery ability and cognition: A critical review. *Journal of Mental Imagery* 2: 181-216.

Faw, B. 2009. Conflicting intuitions may be based on differing abilities. *Journal of Consciousness Studies* 16(4): 45-68.

Fernald, M. R. 1912. The diagnosis of mental imagery. *Psychological Monographs* 14(58): 1-169.

Finke, R. A. 1989. *Principles of Mental Imagery*. Cambridge, MA: MIT Press.

Finke, R. A., and Pinker, S. M. 1982. Spontaneous imagery scanning in mental extrapolation. *Journal of Experimental Psychology: Learning Memory and Cognition*. 8: 142-147.

Flew, A. 1956. Facts and 'Imagination'. *Mind* 65(259): 392-399.

Galton, F. 1880. Statistics of mental imagery. *Mind* 5: 301-18.

Galton, F. 1883/1907. *Inquiries into Human Faculty and Its Development*. London: Dent.

Heuer, F., Fischman, D., and Reisberg, D. 1986. Why does vivid imagery hurt colour memory? *Canadian Journal Psychology* 40(2): 161-75.

- Humphrey, N. 2011. Know Thyself: Easier Said Than Done (Review of Schwitzgebel 2011). *The New York Times*, July 29, 2011.
- James, W. 1890. *Principles of Psychology*. New York: Dover.
- Jelinek, L., Randjbar, S., Kellner, M., Untiedt, A., Volkert, J., Muhtz, C., and Moritz, S. 2010. Intrusive Memories and Modality-Specific Mental Imagery in Posttraumatic Stress Disorder. *Zeitschrift Fur Psychologie/Journal Of Psychology* 218(2): 64-70.
- Kanai, R., and Rees, G. 2011. The structural basis of inter-individual differences in human behaviour and cognition. *Nature Reviews Neuroscience* 12: 231-242.
- Katz A. 1983. What does it mean to be a high imager? In J. Yuille (ed.) *Imagery, Memory and Cognition*. Erlbaum: Hillsdale, NJ.
- Kaufmann, G. 1981. What is wrong with imagery questionnaires? *Scandinavian Journal of Psychology* 22: 59-64.
- Kerr, N. 1983. The role of vision in 'visual imagery' experiments: evidence from the congenitally blind. *Journal of Experimental Psychology: General* 112: 265-277.
- Kerr, N. H. and Neisser, U. 1983. Mental images of concealed objects: new evidence. *Journal of Experimental Psychology: Learning, Memory and Cognition* 9: 212-221.
- Kosslyn, S. M. 1973. Scanning visual images: Some structural implications. *Perception and Psychophysics* 14(1): 90-94.
- Kosslyn, S. M. 1980. *Image and mind*. Cambridge, MA: Harvard University Press.
- Kosslyn, S. M. 1994. *Image and brain: the resolution of the imagery debate*. Cambridge, MA: MIT Press.
- Kosslyn, S. M., Ball, T. M., and 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: 47-60.

Kosslyn, S. M., Brunn, J., Cave, K., and Wallach, R. 1985. Individual differences in mental imagery ability: a computational analysis. *Cognition* 18: 195-243.

Kozhevnikov, M., Kosslyn, S., and Shephard, J. 2005. Spatial versus object visualizers: A new characterization of visual cognitive style. *Memory & Cognition* 33: 710-726.

Levine, D. N., Warach, J., and Farah, M. 1985. Two Visual Systems in Mental Imagery: Dissociation of “What” and “Where” in Imagery Disorder Due to Bilateral Posterior Cerebral Lesions. *Neurology* 35: 1010-1018.

Marks, D. F. 1973. Visual imagery differences in the recall of pictures. *British Journal of Psychology* 1: 17-24.

Marks, D. F. 1983. Mental imagery and consciousness: A theoretical review. In A. A. Sheikh (ed.) *Imagery: Current theory research and applications*. New York: Wiley, pp. 96-130.

Marks, D.F. 1986. The Neuropsychology of Imagery. In D.F. Marks (ed.) *Theories of Image Formation* New York: Brandon House, pp. 225-241.

Marmor, G. S., and Zaback, L. A. 1976. Mental rotation by the blind: Does mental rotation depend on visual imagery? *Journal of Experimental Psychology: Human Perception and Performance* 2: 515-521.

Martin, M. G. F. 2006. On being alienated. In J. Hawthorne and T. Gendler (eds) *Perceptual Experience* Oxford: OUP, pp. 354-410.

McKellar, P. 1957. *Imagination and Thinking*. London: Cohen & West.

McKelvie, S. J. 1995. The VVIQ as a psychometric test of individual differences in visual imagery vividness: A critical quantitative review and plea for direction. *Journal of Mental Imagery* 19: 1-106 .

Nagel, T. 1974. What is it like to be a bat? *Philosophical Review* 83: 435-456.

Forthcoming in Kallestrup & Sprevak (eds) *New Waves in Philosophy of Mind*

Nanay, B. Perception and imagination: Amodal perception as mental imagery. *Philosophical Studies* 150: 239-254.

Neisser, U. 1967. *Cognitive Psychology*. New York: Appleton-Century-Crofts.

Neisser, U. 1970. Visual imagery as process and as experience. In J. S. Antrobus (ed.) *Cognition and affect*. Boston, MA: Little Brown, pp. 159-178.

Nouchi, R. 2011. Individual differences of visual imagery ability in the benefit of a survival judgment task. *Japanese Psychological Research* 53(3): 319-326.

Paivio, A. 1986. *Mental Representations: A Dual Coding Approach*. New York: OUP.

Palmiero, M., Cardi, V., and Belardinelli, M. O. 2011. The role of vividness of visual mental imagery on different dimensions of creativity. *Creativity Research Journal* 23(4): 372-375.

Reisberg, D., and Leak, S. 1987. Visual imagery and memory for appearance: Does Clark Gable or George C. Scott have bushier eyebrows? *Canadian Journal of Psychology* 41(4): 521-526.

Reisberg, D., Culver, L. C., Heuer, F., and Fischman, D. 1986. Visual memory: When imagery vividness makes a difference. *Journal of Mental Imagery* 10: 51-74.

Reisberg, D., Pearson, D. G., and Kosslyn, S. M. 2003. Intuitions and introspections about imagery: the role of imagery experience in shaping an investigator's theoretical views. *Applied Cognitive Psychology* 17: 147-160.

Richardson, A. 1969. *Mental Imagery*. London: Routledge & Kegan Paul.

Richardson, J. T. E. 1980. *Mental Imagery and Human Memory*. London: Macmillan.

Roessler, J. 2009. Perceptual experience and perceptual knowledge. *Mind* 118(472): 1013-1041.

Schwitzgebel, E. 2011. *Perplexities of Consciousness*. Cambridge, MA.: MIT Press.

Forthcoming in Kallestrup & Sprevak (eds) *New Waves in Philosophy of Mind*

Sheehan, P. W. 1967. A shortened form of Betts' questionnaire upon mental imagery. *Journal of Clinical Psychology* 23: 386-389.

Shepard, R. N., and Cooper, L. 1982. *Mental images and their transformations*. Cambridge, MA: MIT Press.

Shepard, R. N., and Metzler, J. 1971. Mental rotation of three-dimensional objects. *Science* 171: 701-703.

Shoemaker, S. 1994. Self-Knowledge and 'Inner Sense'. *Philosophy and Phenomenological Research* 64: 249-314.

Slee, J. 1980. Individual differences in visual imagery ability and the retrieval of visual appearances. *Journal of Mental Imagery* 4: 93-113.

Smithies, D. Forthcoming. The phenomenal basis of epistemic justification. In J. Kallestrup and M. Sprevak (eds) *New Waves in Philosophy of Mind*. Palgrave Macmillan.

Thomas, N. J. T. 2003. Mental imagery, philosophical issues about. In L. Nadel (ed.) *Encyclopedia of Cognitive Science*, Vol. 2. London: Nature Publishing, pp. 1147-1153.

Thomas, N. J. T. 1989. Experience and theory as determinants of attitudes towards mental representation: The case of Knight Dunlap and the Vanishing Images of J. B. Watson. *The American Journal of Psychology* 102(3): 395-412.

Thomas, N. J. T. 2009. Visual Imagery and Consciousness. W. P. Banks (ed.) *Encyclopedia of Consciousness*. Oxford: Academic Press/Elsevier, Volume 2, pp. 445-457. A version with citations and extensive notes is also available online at URL = <<http://www.imagery-imagination.com/viac.htm>>.

Thomas, N. J. T. 2012. Mental Imagery. *The Stanford Encyclopedia of Philosophy* (Winter 2012 Edition), E. N. Zalta (ed.) URL = <<http://plato.stanford.edu/archives/win2012/entries/mental-imagery/>>.

Thomas, N. J. T. Unpublished. Are there people who do not experience imagery? (And why does it matter?) Online discussion note, URL = <<http://www.imagery-imagination.com/non-im.htm>>. Last downloaded on 18.xi.13.

Thorndike, E. L. 1907. On the function of visual images. *Journal of Philosophy, Psychology, and Scientific Methods* 4(12): 324-7.

Tye, M. 1991. *The Imagery Debate*. Cambridge, MA: MIT Press.

Van Leeuwen, N. 2011. Imagination is where the action is. *Journal of Philosophy* 108(2): 55-77.

Watson, J. B. 1913. Psychology as the behaviorist views it. *Psychological Review* 20: 158-177.

Weiskrantz, L. 1997. *Consciousness Lost and Found*. Oxford: OUP.

Weiskrantz, L., Warrington, E. K., Sanders, M. D. and Marshall, J. 1974. Visual capacity in the hemianopic field following a restricted occipital ablation. *Brain* 97: 709-28.

Winch, W. H. 1908. The function of images. *Journal of Philosophy, Psychology and Scientific Methods* 5(13): 337-352.

Zeman, A. Z., Della Sala, S., Torrens, L. A., Gountouna, V. E., McGonigle, D. J., and Logie, R. H. 2010. Loss of imagery phenomenology with intact visuo-spatial task performance: a case of 'blind imagination'. *Neuropsychologia* 48(1): 145-55.

Zimler, J., and Keenan, J. 1983. Imagery in the congenitally blind: How visual are visual images? *Journal of Experimental Psychology: Learning, Memory & Cognition* 9: 269-282.