

*The Philosophical Landscape on Attention*

During the last ten years or so, philosophers of mind quite generally, and philosophers of perception more particularly, have shown a strong renewed interest in the phenomenon of attention. (Debus, 2015)

While psychologists have made attention one of their central targets, philosophers of mind have typically neglected the topic. This period of neglect has now come to an end. (Henry and Bayne, 2013)

What is attention? Nearly everyone describes attention as a process of *selection*.<sup>1</sup> Yet, not all forms of selection count as instances of attention (e.g., natural selection). Let's take selection to be the prioritization of one or more select objects, processes, or events over other objects, processes, or events. A very basic form of selection uses filtering: some objects, processes, or events are prioritized over other objects, processes, or events by making it through a filter. The filter might distinguish between these objects, processes, or events based on their qualities, as a coffee filter distinguishes liquid coffee from coffee grounds, but it might also select arbitrarily, as a gumball machine separates one or more gumballs from the others. In the brain, this most basic form of selection can occur at the level of neurons through neural tuning and neural preference. That is, an individual neuron can select for a particular location in space and fire only when it detects light at that location. In this way, the neuron is acting akin to a neural filter based on spatial location. Importantly, this neural filtering is not taken by most researchers on the topic to count as an instance of attention (see, e.g., Li et al., 2002). Just one reason for this is that the term "attention" standardly applies to organisms, not neurons, and organisms need not be moved by

<sup>1</sup> See Fazekas and Nanay (2018) for an alternative perspective in which attention is the amplification of stimulus-related neural processing that is not triggered by the stimulus: in their view, this "reframes our thinking about the function of attention by shifting the focus from the function of selection to the function of amplification."

the selections of individual neurons. What, then, separates this form of selection from those forms that constitute *attention*? This is where theories of attention tend to diverge.

One popular suggestion is that attention is a form of selection that results from limited processing resources. I will call this “selection from limitation.” This form of selection was perhaps first tied to the concept of attention by Augustine of Hippo, a philosopher who appears to contrast our perceptual limitations to the experience of an unlimited divine being in *City of God* (426 CE): “He sees in some other manner, utterly remote from anything we experience or could imagine. He does not see things by turning his attention from one thing to another. He sees all ...” (Augustine, 2003, 452). Augustine is here contrasting our limited experience, which depends on shifts of attention, to the unlimited experience of a divine being, who “sees all.” In other translations of this passage the term “attention” is not used. Instead, “transition of thought” is said to be present in the human mind, but not a mind with perfect knowledge:

For He does not pass from this to that by transition of thought, but beholds all things with absolute unchangeableness ... nor does His present knowledge differ from that which it ever was or shall be, for those variations of time, past, present, and future, though they alter our knowledge, do not affect His. (Augustine, 1888, 460)

While it may not be clear in this translation that Augustine means to implicate attention, rather than other methods of transition in thought, a key passage on the same page says that in God there is “no variability, neither shadow of turning” – “shadow of turning” does seem to implicate attention, which highlights some things at the expense of others. In any case, many have noted both that humans use attention and that our minds are limited. One might conclude that we use attention *because* we are limited in this way, and so we have selection from limitation.

Selection from limitation is described at the start of many scientific papers on attention, which often use strikingly similar language (emphasis mine):

At any given moment the visual system receives more information than it can fully process. Thus, some portion of the visual input must be selected and *processed more carefully* than the rest. (Kim and Cave, 2001)

At any given moment, our visual system is confronted with far more information than it can *process effectively* ... Visual attention serves as a mediating mechanism. (Carrasco et al., 2004)

At any given moment, our visual system (and indeed every sensory system) takes in far more information than can be *fully processed*. Selective attention allows an individual to choose certain subsets of that information to receive additional processing. (O'Craven, 2005)

These and other papers testify that attention plays an essential role in the reduction of sensory processing. Yet, this leaves at least two questions unanswered: Why are our visual systems limited in this way, and how does this account separate attention from other, more basic forms of selection? The quotes above claim that attention allows for careful processing, effective processing, full processing – all of these could occur through more basic forms of selection without influencing the organism as a whole. Just as one coffee filter might be followed by another, the selective firing of a single neuron might be followed by the selective firing of another neuron without this chain of firing constituting attention, or selection at the level of the organism.

More developed statements assuming this framework of selection from limitation emphasize the organism's behavior (emphasis mine):

At any given moment, the visual system is flooded with a tremendous amount of complex stimuli. Because the brain has limited capacity, not all of this information can be used to guide thoughts and actions ... Indeed, the visual system must focus primarily on information *that has behavioral significance* and ignore information that does not. To do this, the visual system employs selective attention mechanisms. (Chua and Chun, 2003)

At any given moment, our visual system is confronted with more information than it can process. Thus, attention is needed to select *behaviorally relevant information* in a visual scene for further processing. (Bichot and Desimone, 2006)

At any given moment, our visual system is deluged with much more information than can be fully processed. To overcome this limitation, we can use attention, which selectively modulates the processing of sensory information *according to behavioral relevance*. (Busse et al., 2008)

At any given moment, our visual world offers us a large amount of information, far more than what can be processed at one time by our capacity-limited cognitive system. It is therefore crucial to identify and isolate efficiently a subset of objects or a region of the visual field suspected of containing relevant information, so that this information can benefit from preferential processing, and *ultimately guide our actions*. This selection is accomplished by attentional mechanisms. (Brisson et al., 2009)

Note that these quotes take attention to be necessary to limit incoming information to that which is behaviorally significant or behaviorally

relevant. This places selection from limitation at the scale of the organism, which is the proper scale for attention, and successfully distinguishes the selection of attention from other, more basic forms of selection that take place within the brains of complex mammals, such as humans.<sup>2</sup> Yet, we are still missing an answer to the first question – what about behavior requires the selection of attention?

An alternative to selection from limitation is “selection for action.” Selection for action theorists provide much more detail as to why selection is necessary for behavior. The concept of selection for action is perhaps first tied to the concept of attention by Henri Bergson, a philosopher who describes “attention to life” as the conduit for action:

The brain maintains consciousness fixed on the world in which we live; it is the organ of attention to life ... To direct our thought towards action, to bring it to prepare the act that the circumstances call for, – it is for this that our brain is formed. (Bergson, 1920, 93)

Bergson claims that this “attention” keeps the conscious mind focused on a particular activity, selecting both the sensory input and the motor response relevant to that activity (Bergson, 2007, 226).<sup>3</sup> Without such attention, Bergson claims that the conscious mind would be disconnected from the living body, likening the conscious mind to the Cartesian soul (Bergson, 2007, xiii). For Bergson, attention is essential for connecting the unlimited possibilities of consciousness with the limited possibilities of action through the body, allowing for conscious life: “To live is to be inserted into things by means of a mechanism which draws from consciousness all that is utilizable in action ... and darkens the greater part of the rest” (Bergson, 1920, 71). Thus, for Bergson, our limitations come from our need to act, which requires the selectivity of attention. His attention to life is a selection for the sake of action, which is conceptually linked to what has now come to be called “selection for action” (see Section 2.6; Chapter 6).

<sup>2</sup> Yet, it may be that selection from limitation at the scale of the organism would not count as attention for simpler organisms, in which case some further criterion is needed to specify attention. Think, for instance, of a worm that uses hydrogen peroxide to detect and avoid sources of light; while worms are complex enough that we are still studying the role of their few hundred neurons, it seems plausible that they could function without attention (see, e.g., Bhatla et al., 2015). Thanks to Sebastian Watzl for pointing this out to me.

<sup>3</sup> Note that attention to life is a separate form of attention from “voluntary” or “individual” attention, and would not count as attention by the standards of other chapters in this book (Bergson, 1920, 94). Yet, Bergson considers it a low-level form of attention that is with us throughout our lifetime, so long as we are not pathological (see also Lapoujade, 2005). An example Bergson provides of voluntary or individual attention is that of selecting a visual object, whereas his example of attention to life is that of selecting certain wavelengths as visible (Bergson, 1920, 178).

This chapter will take us on a bird's-eye tour of research on attention, from the earliest writings on the topic, prior to the development of the selection from limitation view that has now become popular, to the concept of selection for action, the latest development in philosophical research on attention, spearheaded by Wayne Wu. This book takes a different approach to attention – attention is prioritization by a subject, which need not be for the sake of action. Yet, exposure to the many strands of philosophical work on attention should be helpful for understanding both the context of the book and future possibilities for work on the topic. At the end of the chapter, I will sketch how my own, subject-based approach to attention answers the two questions set out above: *Why are our nervous systems limited in this way, and how does this account separate attention from other, more basic forms of selection?*

## 2.1 Historical Engagement

Although it may seem new, attention is an old topic in philosophy. In fact, scientists who work on attention sometimes mention historical philosophers as precursors to their work. By way of example, Arien Mack and Irvin Rock, the founders of “inattention blindness” (see Section 2.4; Chapter 5), claim to have found mention of the phenomenon in Aristotle:

The phenomenon we have called inattention blindness is one that appears to have been observed and commented on by philosophers long ago but has never before been systematically investigated nor even acknowledged by contemporary psychologists ... Even Aristotle discussed the profound effects caused by the absorption of attention. (Mack and Rock, 1998a, 250)

And we know that centuries before Aristotle, philosophers from the Indian subcontinent were writing on the topic of attention. For example, one of the oldest Upanishads, Chandogya, discusses the dependence of understanding on perception, perception on belief, and belief on attention: “Only he who attends, believes” (Müller, 1897, 121–2).<sup>4</sup> Given the recent resurgence of interest on the topic of attention in philosophy of mind, philosophers have begun to look at historical texts to determine their relevance. I will discuss a few examples below to give a sense of the rich history of research on attention, before turning to more recent work.

<sup>4</sup> While the exact chronology of the Upanishads is unknown, one researcher puts authorship of Chandogya at between the seventh and sixth centuries BCE (Olivelle, 2008, xxxvi).

## 2.1.1 The Prehistory of “Attention”

Research on the contemporary, scientific concept of attention has found that use of this concept began around 1650 in “Western” texts (McMahon, 2008, 299). In a review of the “pre-history of the concept,” Ciarán McMahon found the English term’s lineage to go as far back as 219 BCE (McMahon, 2008, 8). Early usage of the term was “as a practice or activity” in ancient Greece, but was later developed to include both attention as an “aspect of some other person’s subjectivity, to be manipulated or influenced” and, separately, as “an intensity of devotion that one should employ, often in the context of prayer” (McMahon, 2008, 31–2). McMahon found that in the seventeenth century these uses fell to the background as novel uses of the term developed with broader access to and engagement with reading and writing. An important development in novel uses of the term was the idea that attention could be absent or lost – it was then that McMahon thinks attention began to be treated as an “object, or entity,” consistent with contemporary usage (McMahon, 2008, 299).

The use of “attention” quoted above from the Upanishads is consistent with McMahon’s findings; attention is there described as “attention on a tutor (spiritual guide),” later said to occur through performing one’s “sacred duties,” which matches the practice notion of the term in ancient Greece (Müller, 1897, 122).<sup>5</sup> Yet, later texts in so-called Indian philosophy do not appear to conform with McMahon’s analysis of Western texts. Take Alex Watson’s description of the concept of attention in the Nyāya school of Hinduism, using writings from the middle of the first millennium BCE, which sounds strikingly similar to the contemporary concept:

The *manas* – and the power of attention that it carries with it – is an unconscious instrument that is under the control of the self, and that in accordance with the latter’s executive commands can move from sense-faculty to sense-faculty in order to enable the self to focus on and thus receive information from different modalities. Functioning as an intermediary bottleneck between the self and the data received by sense-faculties, its limited capacity explains why the self is aware of only one thing at once, and is not flooded by data from all of the sense-faculties simultaneously. (Watson, 2018)

<sup>5</sup> The use of the term “attention” is based on an eighth-century interpretation of the text by philosopher Adi Shankara. This is brought out in another translation, which separates the main text from “the Bhāṣya of S’āṅkarācārya”:

TEXT – ‘When one serves, then one has Faith; without serving, one has no Faith; it is only when one serves that he has Faith. But service itself should be sought to be understood.’ – ‘I wish, Revered sir, to understand Service.’ BHĀṢYA – ‘Niṣṭhā’, ‘Service’, stands for attending upon the teacher, and being devoted to him for the purpose of attaining knowledge of Brahman (Jha, 1942, 400).

This understanding of attention is clearly as an object or entity (an “instrument”), at least as is meant by McMahan, and comes more than a millennium before the point in time marked by McMahan for this understanding of the term in Western texts. Importantly, Watson explicitly contrasts this concept of attention with that of Buddhists writing in the same era, who did not appear to treat attention as a separate entity. Jonardon Ganeri describes this view at length in his recent manuscript on attention, inspired by Indian philosophers such as Buddhaghosa: “Attention is the active organization of experience and action into centred arenas, and Buddhist *anatta* is the claim that there is no room for something *real* at the centre doing the observing or ordering” (Ganeri, 2017, 26). This is in contrast to the Nyāya view of a self directing the instrument of attention, as described above. These competing views of attention and self mirror contemporary divisions in the literature, as will be seen below (Section 2.7).

Thus, the idea that the contemporary concept of attention emerged in the middle of the seventeenth century doesn’t hold for Indian philosophy, which was introducing many of the debates we are having now over a thousand years ago.<sup>6</sup> Yet, I will focus in this section on Western philosophers from the seventeenth century up to the last. Many such philosophers have engaged with the concept of attention, including René Descartes, Mary Astell, Nicolas Malebranche, John Locke, George Berkeley, Thomas Reid, Immanuel Kant, Mary Wollstonecraft, Georg Hegel, and William Du Bois, whom I discuss briefly below. In some cases I will discuss primary source material, but I will largely depend on secondary literature for this review. This work tends to focus on one of two questions: What is attention, and what is the role of attention in the mind? While these historical philosophers give only partial answers to these questions, many of their ideas resonate with debates that are ongoing today. I will discuss in Section 2.2 work on attention from the tradition of phenomenology, by Edmund Husserl, Martin Heidegger, and Maurice Merleau-Ponty. In later sections I will look at contemporary work from philosophy and the sciences, organized into topics of import.

### 2.1.2 *From Descartes to Du Bois*

Returning to McMahan’s analysis, Descartes’ work is discussed as the final stop in his prehistory of the concept of attention, since “we cannot say

<sup>6</sup> This fact may also be true of other philosophical traditions, such as Chinese philosophy.

for definite whether Descartes deemed it to be an ‘internalised concept’ or ‘object,’ though that would seem most likely” (McMahon, 2008, 292). Yet, Descartes’ novel use of the term is famous enough that it is common for scientific texts to mention his contribution: “Although the word existed in Roman times, there is little reference to any scientific basis for the human capacity for attention until Descartes” (Itti et al., 2005, xxiii). Descartes primarily discusses attention in *Passions de l’âme*. Deborah Brown contrasts the passive, bodily notion of attention found in that text with that of Augustine, whom she found to have a more active, will-based notion.<sup>7</sup> As Brown details, Descartes’ account of attention was described in terms of brain activity, which was unusual for his time. So, Descartes’ understanding of attention is worth noting as one of the first accounts to be based on “mechanical principles” (Brown, 2007, 172).

What’s more, Descartes makes an explicit connection between attention and introspection, making attention an important part of his epistemology: “for I will assuredly reach truth if I only fix my attention sufficiently on all the things I conceive perfectly, and separate these from others which I conceive more confusedly and obscurely” (Descartes, 1901, 257). As Brown puts it, “the mind, for Descartes, needs also to be ‘attentive’ if it is to perceive what is clear and distinct in its ideas” (Brown, 2007, 169). (I discuss this briefly also in Jennings, 2014.)

Inspired by Descartes, Astell and Malebranche likewise saw attention as the route to knowledge: “without Attention and strict Examination, we are liable to false Judgments on every occasion” (Astell, 2017, 202) and “it is only by the mind’s attention that all truths are discovered, and all sciences are learned” (Peppers-Bates, 2005, 101). In the case of Astell, attention is primarily discussed as a path to character formation, which she saw as particularly important for the subjugated women of her era. That is, she thought redirecting their attention would help them to achieve the knowledge and virtue she thought they lacked, due to this subjugation (Broad, 2015, 36). (This theme comes up again in the work of Wollstonecraft, discussed below.) Attention plays an even more essential role in the work of Malebranche, according to Susan Peppers-Bates: she argues that we cannot understand Malebranche’s arguments without including a role for attention (Peppers-Bates, 2005, 97).

<sup>7</sup> While McMahon found Augustine’s notion of attention to be theological in nature, conflating mind and soul, and to primarily concern “spiritual and literary exercise” (McMahon, 2008, 146), Brown finds Augustine to have had a more significant contribution, saying that he “anticipated more accurately the findings of contemporary psychologists” (Brown, 2007, 175).

To demonstrate the contribution of attention to knowledge, Malebranche uses a now famous example of a triangle – attention is how we illuminate certain properties of a triangle, allowing for knowledge about triangles, in general (Peppers-Bates, 2005; Nolan, 2017). The triangle example comes up prior to Malebranche in the work of Descartes, and it is picked up again in the work of Locke and Berkeley (Baxter, 1997). Locke famously commented that the abstract idea of a triangle could not exist, since it would have to contain inconsistent parts in order to stand in for all possible triangles. Locke's treatment of the triangle is unsuccessful, some have argued, because it does *not* make use of attention (Pyle, 2013, 52–3). Indeed, Berkeley argued against Locke that we can attend to a triangle using broad scope, leaving out details that would cause inconsistency in the general idea: “And here it must be acknowledged that a man may consider a figure merely as triangular, without attending to the particular qualities of the angles, or relations of the sides. So far he may abstract; but this will never prove that he can frame an abstract, general, inconsistent idea of a triangle” (Berkeley, 1881, 13–16). Thus, Berkeley is able to avoid the problem of an inconsistent idea by invoking the power of attention. As Christopher Mole puts it, “In these sentences Berkeley is not attempting to elaborate a theory of attention. He says nothing more about the idea that attention might enable thought about abstractia. It is nonetheless clear that he requires attention to play an important role in his picture of the mind” (Mole, 2017).

While Locke may not have seen a potential role for attention in the triangle example, he has a separate contribution to make to the discussion on attention. Namely, Locke proposed the idea that attention is a mode of thought, rather than a separate entity. For Locke, modes are distinct from substances (such as thought) in having secondary metaphysical status; whereas thought is an activity of the soul, attention is just one type of such activity. As we have seen, the rejection of attention as an entity occurs in the work of earlier scholars, such as Buddhaghosa, writing in the fifth century BCE (Ganeri, 2017). Yet, Locke's treatment is distinct from Buddhaghosa's. For one, Buddhaghosa does not use his insights to argue that attention is unimportant. In fact, according to Ganeri, Buddhaghosa's entire manuscript is a reflection on a quote about attention: “Cultivate attention, bhikkhus; a bhikkhu who attends knows things as they are” (Ganeri, 2018).<sup>8</sup> Mole, on the other hand, finds that Locke's brief treatment of attention is a result of his theory of attention:

<sup>8</sup> A “bhikkhu” is a monk, the audience of Buddhaghosa's book.

Locke's modal view of attention has the consequence that no very substantive theory of attention is needed once our theory of thinking is in place ... Locke viewed attention as an explanatorily slight phenomenon – a mode of thought that is not in need of much explanation, nor capable of providing much. (Mole, 2017)

As will be seen in a Section 2.3, Locke's theory of attention has nonetheless inspired more lengthy accounts of the phenomenon, such as Mole's own.

As a further contribution, Locke's description of the relationship between attention and memory may have inspired the broader project of separating attention from consciousness. For Locke, attention is the mode of registering thought in memory, which ranges from a full-on study of stimuli to a state of reverie where the objects of perception make no impression in memory: "That there are ideas, some or other, always present in the mind of a waking man, everyone's experience convinces him; though the mind employs itself about them with several degrees of attention" (Locke, 1841, 140). Gideon Yaffe claims that Reid follows Locke in finding that "for something to 'inhere' in the mind is for that mind to be conscious of it," but also that "it is one thing for a mind to be conscious of something – for that thing to inhere in the mind – and quite another for it to understand the nature of that of which it is conscious" (Yaffe, 2009, 165–6). According to Yaffe, Reid argues that attention is what allows us to reflect on the objects of consciousness. Thus, we need attention to be aware of our awareness, but not for awareness itself. These ideas are taken up in contemporary debates about whether there is consciousness without attention (Section 2.5), and whether knowledge depends on attention (Section 2.4).

Following Yaffe's claim that knowledge requires attention in the work of Locke, Reid, and others, Melissa Merritt and Markos Valaris have argued that, for Kant, "perceptual contact with objects requires *directed attention*" (Merritt and Valaris, 2017, 585). They base this claim on a careful reading of a footnote of Kant's in the *Critique of Pure Reason* (see also Gasché, 2008):

I do not see why so much difficulty should be found in admitting that our inner sense is affected by ourselves. Such affection finds exemplification in each and every act of *attention*. In every act of attention the understanding determines inner sense, in accordance with the combination which it thinks, to that inner intuition which corresponds to the manifold in the synthesis of the understanding. (Kant, 2003, 168)

It is clear in this footnote that Kant thinks that attention can be directed by the self, and that attention makes an impact in doing so ("our inner sense is affected by ourselves ... in each and every act of attention"). He uses

the example of directing our attention to our internal mental life and finding it altered by the act of attending. It is not clear to me that Merritt and Valaris are right in extending Kant's meaning from "inner sense" to external perception, an interpretation which they admit differs from Henry Allison's earlier, narrower interpretation: "Our reading thus contrasts with Allison's (2004: 284) reading of the same passage ... what Kant really has in mind, Allison contends, are only those acts of attention specifically directed towards the subject's own inner states" (Merritt and Valaris, 2017, 581). If Merritt and Valaris *are* right, then Kant's work is relevant for debates on the relationship between attention and perception, discussed in Section 2.4.

Regardless of whether Merritt and Valaris are right about the above, Kant's work touches on other contemporary debates, including the question of whether attention is directed by a self (see Section 2.7), and how this is distinct from other forces on the direction of attention. That is, in Kant's writings on education and aesthetics he warns that attention can be captured passively by beautiful and otherwise distracting objects, as when he claims that

we linger over the contemplation of the beautiful because this contemplation strengthens and reproduces itself, which is analogous to (though not of the same kind as) that lingering that takes place when a [physical] charm in the representation of the object repeatedly arouses the attention, the mind being passive. (Kant, 1914, 30)

Thus, Kant understood that attention can be divided into active and passive types, a division that we find in scientific research on attention today, and which is discussed further in Chapter 3. This seems to diminish the role of the self in the direction of attention, at least in certain cases.

Unlike Kant, Hegel finds attention to always be effortful and dependent on the will: "attention is something dependent on my *willfulness*, therefore, I am only attentive when I *will* to be so. But it does not follow that attention is an easy matter. On the contrary, it demands an effort" (Hegel, 2007, 179). It is worth noting that Hegel is using the same German term here that Kant uses when discussing attention as sometimes passive: "aufmerksamkeit" (Kant, 1922, 61). Thus, this is not a translation issue. One might be forgiven for thinking so, since, as Willem deVries puts it, "attention (Aufmerksamkeit) is a fairly strong word, implying a high degree of conscious mental activity and willful self-control" (deVries, 1988, 112). It is thus surprising that Kant thinks it can be passive.<sup>9</sup> On the

<sup>9</sup> Yet, this aligns with my own thinking on the matter (see Chapter 3; Jennings, 2012).

other hand, that Hegel interprets attention as demanding effort makes it all the more striking that he finds perception to depend on attention: “Without attention, therefore, no apprehension of the object is possible” (Hegel, 2007, 179) and “Apart from such attention there is nothing for the mind” (Hegel, 1971, 448). As deVries argues, Hegel’s conception of attention makes this claim of dependence implausible on its face. Yet, the connection between attention and perception seems less implausible on a broader interpretation of attention, such as that offered by Kant and further developed by Husserl, as I will argue in Chapter 4.

As a final stop in our tour of historical philosophy, I want to return to a topic raised by Astell, continued by Wollstonecraft and Du Bois. Wollstonecraft writes some years before Hegel about the importance of attention for the mind, particularly in education. Like Astell, she encourages a redirection of attention as a start to ending the subjugation of women:

Men have various employments and pursuits that engage their attention, and give character to the opening mind; but women, confined to one pursuit and having their thoughts constantly directed to the most insignificant part of themselves, seldom extend their view beyond the triumph of the hour. (Wollstonecraft, 2002, 135–6)

She quotes Rousseau in a footnote, who said that women can not be geniuses due to a lack of attention, a sentiment Wollstonecraft clearly disagrees with. Instead, she thought that women needed their attention to be directed to different things, in different ways, to achieve educational equality. Some one hundred years after Wollstonecraft, Du Bois takes a similar tack to the problem of racial inequality, advocating changes to the educational system: “These powers of body and mind have in the past been strangely wasted, dispersed, or forgotten” (Du Bois, 2008, 12). While Du Bois doesn’t use the term “attention,” he sees the problem to be one of “double aims” and “turning hither and thither in hesitant and doubtful striving,” which reads as a problem of split attention (Du Bois, 2008, 13). A main cause of that split attention, according to Du Bois, is “the facing of so vast a prejudice” (Du Bois, 2008, 21). These ideas predict later scientific findings on how facing harmful stereotypes can reduce one’s ability to direct attention, among other functions (Schmader et al., 2008; Inzlicht and Kang, 2010).

We have seen two major themes in historical philosophy regarding attention: discussions about the nature of attention and discussions about the impact of attention on the mind. The Nyāya school, Buddhaghosa, Augustine, Descartes, Locke, Kant, Hegel, and Bergson fit in to the first theme, whereas the Chandogya, Aristotle, Descartes, Astell, Malebranche,

Locke, Berkeley, Reid, Kant, Wollstonecraft, Hegel, and Du Bois fit into the second. Attention gains more prominence in recent history, beginning with the branch of philosophy known as “phenomenology,” where both themes continue to be debated.

## 2.2 Phenomenology

In this section I will look briefly at the contributions of three philosophers in the phenomenologist tradition: Husserl, Heidegger, and Merleau-Ponty. Phenomenology, or the study of experiential phenomena as they are given, arguably began with Husserl, a contemporary of Bergson and Du Bois. Husserl thought that we could avoid the threat of *psychologism*, or the temptation to provide psychological explanations for matters that do not afford of such explanations (e.g., logic), through the development of a special science for experiential phenomena, or *phenomenology*. Husserl saw phenomenology as having its own techniques and tools. These include setting aside background assumptions about the nature of reality and observing our experience for what it is – that is what is meant above by phenomenology being the study of “experiential phenomena as they are given.”

This is a start to understanding phenomenology, but the suggestion that we are “observing” what is “given” is likely to invoke inappropriate background assumptions. Importantly, phenomenology should not be equated with introspection – a common misunderstanding (Cerbone, 2012). Phenomenology assumes neither that experience is observable and fixed, nor that experience is given by the world. Rather, one of the important insights of phenomenology is that experience is fluid and lived. Thus, the language of introspection is a poor fit. Phenomenologists commonly describe their process as one of *reflection*, rather than introspection.

Contemporary analytic philosophers have started to use the term “phenomenology” to refer to experience itself, or its subjective characteristics, rather than the science of experience. This appears to be what Wu has in mind when he writes “Perhaps attention does not have a uniform phenomenology associated with it” (Wu, 2014, 140). Yet, these philosophers often seem to limit themselves to the method of introspection, not benefiting from the fruits of phenomenological reflection. On the topic of attention, this difference is crucial. Husserl shows us why.

Husserl defines attention as a “tending of the ego toward an intentional object” (Husserl, 1975, 80). As this is a phenomenological definition, we know that this “tending of the ego” describes an aspect of experience discoverable through phenomenological reflection. This aspect is the active

mode of experience. In general, we think of experience as being either active or passive – the two modes of experience, divided by the feeling of effort (Jennings, 2012). Yet, Husserl argues that there is actually another, third mode of experience: pure passivity. If we simply “introspected” on our experience we might not discover it, since “contemplative apprehension” already has “an element of activity” (Husserl, 1975, 60). That is, “introspection” requires that we cognize the objects of experience, which means that we are not accessing the purest forms of experience that occur prior to this act of cognizing. One might compare this insight to that of Ned Block on the distinction between phenomenal and access consciousness, described in Chapter 5 (Block, 2008a). Resolving the apparent dispute between Kant and Hegel, Husserl finds that attention can be “passive,” but not purely passive, since it always involves some degree of activity, some degree of cognizing. It is the experience of this activity that is the mark of attention for Husserl, discoverable through contrast with the purely passive mode.

Worth noting is the way that even here the idea of “introspection” can get us into trouble, since it implies that we can hold steady experience while we view it, which makes it difficult to understand Husserl’s argument. If we could hold experience steady while we view it, surely we could separate the object of introspection – the mode and content of the experience being introspected – from the mode of the introspecting experience. In that case we could introspect *an experience in the passive mode* even if the mode of introspection is *itself active*. It is clear that, for Husserl, this is not how experience works.<sup>10</sup>

Husserl makes two other contributions on the topic of attention that are relevant to this book. First, Husserl explains attention through the self. The “tending of the ego” from Husserl’s definition refers to an “ego,” which I have not yet defined. In fact, these concepts change over Husserl’s oeuvre. His definition for attention occurs in what is thought of as his mature philosophy, in which the ego is understood as something existing outside of experience (à la Kant): “the pure ego cannot be encountered in phenomenological reflection ... rather, the pure ego is what Husserl sometimes calls an *essential posit*” (Sheredos, 2017). In his earlier writings, he understood attention differently. Husserl did not yet speak in terms of the active and passive mode, instead describing attention through the resultant transformation of consciousness: “Attending is thus represented as a straightforward, not further describable *way* in which contents, otherwise

<sup>10</sup> Interested readers can look to Ford and Smith (2006) for a detailed account of Husserl’s notion of mode as it relates to attention, and how we might understand this through the lens of contemporary neuroscience.

lost in the undivided flow of consciousness, achieve separate consciousness, in which they are ‘emphasized’ or ‘discovered’ by us” (Husserl, 2001, 156). This early position sounds similar to that of Buddhaghosa and Locke, whereas his later position provides a role for the ego, or self, by looking beyond experience to explain the source of attention and the active mode.

Second, Husserl’s earlier writings include the idea that the role of attention is to provide “the meaning or reference which gives names and other expressions their significance” (Husserl, 2001, 153). That is, by allowing emphasis in consciousness, attention provides us with reference, which provides us with knowledge. One might compare this insight to that of John Campbell on the contribution of conscious attention to reference and knowledge, discussed in Chapter 4 (Campbell, 2002). Thus, even if “attentional experience is never considered by Husserl himself in a detailed way,” his contributions are worth noting (Depraz, 2004, 6).

As a student of Husserl, Heidegger’s account of attention has both similarities and differences with the above. A recent paper by Lawrence Berger covers Heidegger’s treatment of attention at length, citing from across his corpus (Berger, 2017). The terms used by Heidegger are different, which is to be expected – Heidegger is famous for creating a new set of terms that he thought would better capture his theory of mind (see, e.g., Dahlstrom, 2013). Whereas Husserl and his (German-speaking) predecessors used “aufmerksamkeit,” Heidegger uses “achtsamkeit.” The former, as we have seen, is associated with selection and allows for perceptual knowledge, whereas the latter is associated with the focus or *mindfulness* of attention. Heidegger emphasizes the importance of being a certain way – less distanced from the world and more engaged in the world – which, according to Berger, he sees as requiring attention of the second type: “I hold on, staying with my embodied presence regardless of whatever influences arise that may take attention away, resisting the impulses to be absorbed or immersed in whatever distracts from the task at hand” (Berger, 2017, 15). What allows for this form of attention is being itself, according to Berger: “Being is the source of the movement of attention” (Berger, 2017, 37). Thus, whereas Husserl sees attention as an activity of the ego, Heidegger sees attention as an activity of being, which allows for a certain form of being. Heidegger might say of Husserl that he is too caught up in the “ontological” versus the “ontic,” or stuff rather than activity, but each seems to recognize the importance of attention as an expression of self, which will be further discussed in Section 2.7 and Chapter 3.<sup>11</sup>

<sup>11</sup> Worth noting is that Heidegger’s notion of being-in-the-world or being-here is similar to my notion of conscious entrainment, discussed in Chapter 5, but I see that form of consciousness as occurring without the benefit of attention, since my sense of “attention” is closer to Husserl’s.

Merleau-Ponty picks up a different thread from Husserl – the role of attention in gaining knowledge. I discuss Merleau-Ponty at length in Chapter 4, but it is worthwhile seeing the contrast with Husserl and Heidegger here. Like Husserl and Heidegger, Merleau-Ponty sees attention as an activity by a “subject,” but instead of the “ego” or simply “being,” he has his own distinct view as to what the subject might be, which necessarily involves the body (Toadvine, 2018). Yet, he does not speak at length about the relationship between this “body-subject” and attention, focusing instead on the role of attention in bringing about perceptual knowledge (Merleau-Ponty, 2012, 29–34). He criticizes the idea that attention simply illuminates or clarifies knowledge, whether from the world or from the mind (Merleau-Ponty, 2012, 29). As he puts it, “Consciousness is too poor in the first case and too rich in the second . . . neither grasps consciousness in *the act of learning*” (Merleau-Ponty, 2012, 30). In contrast with these ideas, he sees attention as *constituting the determinate world*, and the world prior to attention as being indeterminate: “attention is the active constitution of a new object that develops and thematizes what was until then only offered as an indeterminate horizon” (Merleau-Ponty, 2012, 33). In his discussion of attention and its role in perceptual knowledge, some of his statements resonate with Husserl’s argument on purely passive experience: “Consciousness must be brought face to face with its unreflective life in things and must awaken to its own, forgotten, history – this is the true role of philosophical reflection and this is how a true theory of attention is established” (Merleau-Ponty, 2012, 34). That is, attention is revealed by the transition from the indeterminate and unreflective to the determinate and reflective. One might compare this insight to that of Bence Nanay on the contribution of attention to perceptual determinacy (Nanay, 2009).

In the next section I will review some skeptical approaches to the topic of attention that developed at the same time as phenomenology, before moving to contemporary debates about the relationship between attention and other functions of the mind.

### 2.3 Skeptical Approaches

At the same time that phenomenologists were finding attention to have a substantial role in the mind, others were rejecting it as a useful concept. The wholesale rejection of attention grew out of behaviorism, or the movement aimed at putting psychology on a more scientific foundation: “behaviorism imposed a black-out on much academic discussion of unobservable entities such as ideas and attention” (LaBerge, 1995, 21). This movement

began in the early twentieth century with psychologists such as Burrhus Skinner, who made advances in behavioral prediction without reference to “inner causes,” such as attention (Skinner, 1953, 27). Alongside behaviorism emerged the philosophical movement of logical positivism, which likewise sought to end what they saw as obscurantism in philosophy by removing discussion of unobservables (Caldwell, 2010, 13). These movements fit well within an era that prized simplicity and clarity (Magee, 2001, 108). Unfortunately, the aim for simplicity and clarity sometimes came at the cost of completeness and accuracy, as in the case of attention:

Behaviorists were seemingly uncomfortable not only with introspective methods, but also with the existence and demonstrable potency of selective attention itself. Selectivity is a problem for anyone who wishes to predict behavior purely on the basis of the objective stimulation making up the animal’s learning history. (Pashler, 1998, 6)

Findings demonstrating the existence of selective attention in the “cognitive revolution” of the 1950s and 1960s by psychologists such as Edward Cherry put a virtual end to this movement (Cherry, 1953).

While behaviorists rejected attention altogether, others rejected it as a unified concept. This idea is introduced by Ludwig Wittgenstein, who claims that there are many, quite different ways of attending:

But do you always do the *same* thing when you direct your attention to the colour? ... You sometimes attend to the colour by putting your hand up to keep the outline from view; or by not looking at the outline of the thing; sometimes by staring at the object and trying to remember where you saw that colour before. (Wittgenstein, 2009, 14)<sup>12</sup>

Indeed, psychology includes a great many forms of attention: covert and overt, spatial and feature, active and passive, endogenous and exogenous, top-down and bottom-up, focal and diffuse, etc. While it is my position that these can be understood under a single, unified concept, many have demonstrated distinctions between them (see, e.g., Connor et al., 2004; Kanai et al., 2006; Navalpakkam and Itti, 2006; Buschman and Miller, 2007; Beck and Kastner, 2009; Baluch and Itti, 2011; Carrasco, 2011; Posner, 2012; Petersen and Posner, 2012). This has led to a fairly common skeptical position in both philosophy and psychology:

At the psychological level attention is not any one thing ... Hence, there cannot be a single definition of, and probably not a single, overarching theory of, attention. (Parasuraman, 1998, 4)

<sup>12</sup> Wittgenstein uses the same German term as Kant and Husserl: *aufmerksamkeit*.

The present book takes a more empirical and more skeptical tack, assuming instead that no one knows what attention is, and that that there may even not be an “it” there to be known about (although of course there might be). (Pashler, 1998, 1)

Attention, like memory, is disunified, it is not a single psychological kind. (Ganeri, 2017, 25)

In other words, we should not treat attention as a unified concept, since it corresponds to so many different psychological phenomena.

The above reasoning has led some to redefine attention, such as Mole. Mole takes inspiration from Locke, discussed above, in arguing that attention is not a process at all, but a way that a process might proceed. It is, in other words, an “adverbial” phenomenon, according to Mole, comparable to the role adverbs like “haste” have in language (Mole, 2011a, 26).<sup>13</sup> Mole bases this view on the claim that while there is no unified *process* of attention, there is a unified theory of attention available – attention is cognizing in a unified way (Mole, 2011a, 51). To show that there is no unified process of attention, Mole argues against a number of possible accounts. For example, Anne Treisman’s popular “feature-integration theory” won’t work because feature-binding sometimes occurs without attention: “given that the processes of feature-binding constitute attention in some contexts, it should be impossible for events constituting those same feature-binding processes to take place without constituting attention” (Mole, 2011a, 37). In other words, there is no single process that is always and only attention. Kranti Saran argues that this line of reasoning is unsuccessful: “Mole’s argument fails because it equivocates between the set of conditions that suffice for constituting attention and the subset of those conditions that are salient, but insufficient, for constituting it” (Saran, 2018). In Treisman’s case, we shouldn’t take feature-binding to “constitute” attention in the first place. Indeed, even in Treisman’s view feature-binding occurs without attention (see Chapter 4; Treisman, 1988). I take it that my own subject-based account of attention can provide a unified process, *pace* Mole.

A final skeptical position remains: Is it possible to provide a noncircular definition of attention that also captures the many phenomena associated with attention (Taylor, 2015)?<sup>14</sup> David LaBerge provides us with a way forward that is similar to my own stance on these issues. For LaBerge,

<sup>13</sup> Another philosopher whose theory takes inspiration from language is Philipp Koralus, whose “erotetic theory” of attention is modeled after the role of questions in language (Koralus, 2014b).

<sup>14</sup> Taylor does not consider my subject-based theory of attention in his arguments against unified accounts, probably because it is ironclad (see, e.g., Jennings, 2012).

“attention can be expressed in many pathways of the brain,” in keeping with the above (LaBerge, 1995, 2). Yet, there is a single locus of control for these many expressions: “It could be conjectured that much of the activity in these other cortical areas are expressions of attention, while the control of these attentional expressions resides with activity patterns of the prefrontal cortex” (LaBerge, 1995, 132). As is noted by Pierre Vermersch, many theorists confuse attention with that which it modulates because they fail to include the source of modulation in their theory (Vermersch, 2004, 51). If we focus on the source of attention, rather than on the effects of attention or on what attention modulates, we might be able to find a unified process, à la LaBerge. Against LaBerge, some are doubtful that a single source for the control of attention can be found: “Although it would certainly be convenient if different aspects of attention were controlled by common, or even homologous, mechanisms, this clearly is not the case, at least in the primate visual system” (Moore and Zirnsak, 2017). These issues will be taken up again in Section 2.7 and Chapter 3.

#### **2.4 Attention, Perception, and Knowledge**

Up to this point I have reviewed historical work on attention, with a focus on Western philosophy from the seventeenth to the twentieth century. Most recent debates about attention have to do with the contributions it makes to perception, knowledge, consciousness, and action. In the next few sections I briefly review some such work, starting with perception and knowledge.

As we saw above, the dependence of perception and knowledge on attention is one of the recurring themes in historical philosophy on attention, and it is certainly an important theme in this book (see Chapter 4). Yet, some of the most significant contemporary work on this topic has been in the sciences. Two hugely influential contributions to the topic have been Treisman’s feature integration theory, mentioned above and discussed at length in Chapter 4, and Mack and Rock’s work on inattention blindness, mentioned above and discussed at length in Chapter 5 (see, e.g., Treisman, 1988; Mack and Rock, 1998a). The former demonstrates the transformative role that attention has in perception, whereas the latter demonstrates the dependence of perception on attention. Both have had a significant impact on the philosophy and psychology of attention.

Treisman’s work began with the finding that it is easier to search for visual percepts according to a single feature than to search according to

two or more features at once (Treisman and Gelade, 1980). That is, it is easier to search for someone wearing a red shirt than it is to search for someone wearing a red and white striped shirt (with a red and white striped hat and round circular glasses; Handford, 2012). According to Treisman, this is because multiple features have to be combined in the latter case, and the work of accurately combining features depends on attention, at least for unfamiliar combinations. In feature integration theory, attention selects and binds the features that go with each object according to the spatial location of that object (Treisman, 1988). Without attention, this binding can still occur based on either familiarity or chance, but it will be less accurate.

As was mentioned in Section 2.2, Campbell sees the role of attention to be that of highlighting visual content, allowing for reference and knowledge (Campbell, 2002). He uses Treisman's theory as evidence for his view: our ability to refer to features of an object once it has been highlighted for us depends on the same mechanism that binds those features – attention. Imogen Dickie likewise argues that knowledge depends on attention, and likewise uses Treisman's findings as evidence, but in her case she sees attention as allowing for “non-lucky” reference (Dickie, 2011). Both views are discussed at length in Chapter 4.

Mack and Rock's work discovered a more substantial connection between attention and perception: “This book is a narrative description of research designed to explore perception without attention that began in 1988 ... The research brought to light some dramatic and surprising findings ... there seems to be *no conscious perception without attention*” (Mack and Rock, 1998a, ix). Mack and Rock tested participants with unexpected stimuli while they were engaged in a separate task, and found that they often did not report seeing those stimuli (Mack and Rock, 1998a, 13). This has been popularized through other studies, such as the now famous “gorilla experiment” (Simons and Chabris, 1999). Yet, Mack and Rock's work is much more thorough than these other studies, encouraging them to conclude that a stimulus is consciously perceived only if attention is engaged by it, otherwise remaining “implicit, unconscious” (Mack and Rock, 1998a, 228). This work is reviewed at length in Chapter 5 (see also Mole, 2008; Suchy-Dacey, 2012).

An important finding related to Mack and Rock's work has to do with the scope of attention. Namely, they found that attention modulates both task-relevant and task-irrelevant stimuli, such that task-irrelevant stimuli are sometimes, but not always, strong enough to be consciously perceived, depending on attention (see also Seitz and Watanabe, 2008, 2009). This

fits the view that the scope of attention can include the entire visual field, in contrast to those who see attention as modulating only one stimulus at a time (see also, e.g., Datta and DeYoe, 2009). In fact, I find it useful to think of attention as operating over an entire sensory field, in keeping with John Reynolds and David Heeger's "normalization model" of attention. In this model, there are stimulation and suppression fields, which depend on local forms of selection, and then there is the "attention field," which operates over the combined stimulation and suppression fields (Reynolds and Heeger, 2009). I discuss this view further in Chapter 3.

Despite the findings of Mack and Rock, the idea that perception depends on attention continues to be controversial (see, e.g., Nanay, 2009; Siegel and Silins, 2015; Prettyman, 2017). I nonetheless argue in favor of this view in Chapter 4, making the case independently of Mack and Rock's findings (see also Jennings, 2015a, 2015c). Instead, I discuss their findings in Chapter 5, since many philosophers see them as most relevant to the question of whether attention is necessary for consciousness, in general. This is the issue I turn to next.

## 2.5 Attention and Consciousness

In philosophy, perhaps the most discussed topic concerning attention in recent years has been its relationship with consciousness. As was mentioned in Section 2.3, attention benefited from the cognitive revolution of the 1950s, becoming one of the largest areas of cognitive psychology. It took several more decades for consciousness to be considered a respectable topic in the sciences (Crick and Koch, 1990). During this period, there was relatively little work on attention within philosophy, which instead focused on the phenomenon of consciousness (e.g., Nagel, 1974). As philosophy and science have come closer together in the last few decades, it is no wonder that the question of how these two phenomena are related has become an important one. In this section I provide an overview of some of the research on this topic.

Most researchers agree that attention and consciousness overlap, but differ on the extent of this overlap. Michael Posner was an early advocate of the view that "the mechanisms of attention form the basis for an understanding of consciousness," and still believes that "much can be learned about consciousness from an understanding of attention" (Posner, 2012; see also Posner, 1994). Christof Koch and Naotsugu Tsuchiya have instead emphasized differences between consciousness and attention:

“top-down attention and consciousness are distinct phenomena that need not occur together and that can be manipulated using distinct paradigms” (Koch and Tsuchiya, 2007). The latter is closest to my own view, according to which consciousness is not necessary for attention, since attention can modulate unconscious stimuli, and attention is not necessary for consciousness, since some forms of consciousness operate without need of attention (see Chapter 5). Yet, in between these views falls most philosophical work on the topic, with some finding consciousness to be necessary for attention, and others finding attention to be necessary for consciousness.

That consciousness is necessary for attention is the more traditional perspective in philosophy. According to Mole, this is just common sense: “According to commonsense psychology, one is conscious of everything that one pays attention to, but one does not pay attention to all the things that one is conscious of” (Mole, 2008). Felipe de Brigard conducted an empirical study to combat this claim: “The first thing to notice about these results is that they pose a serious threat to Mole’s claim that, according to commonsense, consciousness is necessary for attention” (De Brigard, 2010). While it may not be the commonsense view, a popular stance in philosophy is that attention depends on consciousness, since “conscious experience of an object is necessary for attention to the object” (Smithies, 2011, 259). Against this, we are able to search for objects outside of our awareness using attention. Think, for example, of when someone says, “Will you listen to that?” – you need not have been consciously aware of the sound in question in order to discover it using attention. Yet, one might claim that consciousness is necessary for attention because attention *brings about* conscious experience of an object once it is applied to it: “The claim that attention is sufficient for consciousness can be challenged only by showing a case where an object representation is modulated by attention without being consciously experienced” (De Brigard and Prinz, 2010, 55). We might separate these claims: conscious experience of an object is necessary for one to *direct attention toward* an object versus conscious experience of an object is *a necessary result* of attending to an object. My disagreement is with the former, but I can imagine the failure of the latter for ephemeral objects, that do not last as long as it takes to direct attention toward them.

That attention is necessary for consciousness is gaining acceptance in philosophy and cognitive science. This is the perspective put forward by Stanislas Dehaene and Lionel Naccache in their popular “global neuronal workspace” theory of consciousness: “To enter consciousness, it is not sufficient for a process to have on-going activity; this activity must also

be amplified and maintained over a sufficient duration” (Dehaene and Naccache, 2001, 14). It is likewise supported by Jesse Prinz: “The neural processes underlying attention are the physical mechanisms by which the neural correlates of intermediate-level representations become conscious” (Prinz, 2011a). Both use a number of empirical studies to make their claims. Carlos Montemayor and Harry Haladjian use such evidence to argue that attention must have evolved first, followed by “a ‘functionally useless’ and limited phenomenal consciousness,” and finally conscious attention, which “allows for the integration of perceptual inputs as well as past memories, emotion, and imagination” (Montemayor and Haladjian, 2015, 176–212). They conclude that “attention . . . is necessary for consciousness” (Montemayor and Haladjian, 2015, 23). Sebastian Watzl has given a more philosophical argument for the claim, based on what he takes to be the essential characteristics of consciousness: “Without attentional structure consciousness would not be the unified, subjective perspective it is” (Watzl, 2017, 7).<sup>15</sup> While I agree that attention provides structure, I disagree that it likewise provides unity, which I think is provided by the subject (see Chapter 4). For this reason and others I do not find attention to be necessary for consciousness, which is discussed at length in Chapter 5. As I discuss in that chapter, my view is roughly consistent with philosophers such as Campbell and Block, who have likewise argued against the idea that consciousness requires attention (see, e.g., Campbell, 2012; Block, 2014). Yet, in that chapter I present empirical evidence that I think better makes the case for this view.

## 2.6 Attention and Action

As was discussed at the beginning of this chapter, work relating attention to action is a promising new development in philosophy, which has the potential to explain the existence and nature of attention. This development was spearheaded by Wu, himself inspired by work in psychology from the late 1980s. Recall the discussion of selection for action, above; “selection for action” was coined by Alan Allport in a chapter paired with another by Odmarr Neumann some thirty years ago (Allport, 1987; Neumann, 1987). They separately argue that selection is necessary for action due to

<sup>15</sup> Ganeri likewise argues that attention provides structure: “Attention is not a space of awareness distinct from and occupied by exercises of experience and agency, but the ongoing structuring of experience and action” (Ganeri, 2017, 12).

limitations of the body in both planning and executing action, but they describe different limitations on this process.

Starting with Neumann, imagine that you want to wash your hands and pour a glass of water at the same time. You need your hands (the “effectors”) to achieve both of these behaviors. In other words, these actions compete for “effector recruitment.” You will have to select one of these actions to perform at a time in order to perform either of them. Moreover, multiple sets of “parameters” for the requisite hand movements could accomplish each of these actions. You could, for instance, wash your hands quickly or slowly, holding the hands high or low relative to the spout, stacking your hands vertically or horizontally while washing, etc. For you to achieve either of these actions, you must select one set of parameters for each act. Following considerations like these, Neumann argues that we should link attention to function-specific limitations, replacing the purportedly outdated concept of function-general limitations (“Capacity considerations”): “independent of all Capacity considerations, selection is evidently needed for the control of action” (Neumann, 1987, 374).

In agreement with Neumann’s approach, Allport adds a new reason that selection is necessary for action: perceptual-motor coupling. Allport’s idea is that because sensory and motor processing occur separately in the brain, the processing of the sensory target and motor response will have to be coupled to allow for action: “The need for such a mechanism (of selective coupling and decoupling of perceptual and motor processes) arises directly from the many-to-many possible mappings between domains of sensory input and of motor output within the very highly parallel, distributed organization of the nervous system” (Allport, 1987, 397). Although action is thought to require both perceptual-motor coupling and the selections described above by Neumann, “selection for action” is now typically understood as only the former.

The concept of selection for action has inspired the present debate on the relationship between attention and action. Wu, for example, argues that attention is necessary for action. His “Many-Many Problem” mirrors Allport’s:

agency implies a solution to the Many-Many Problem, a solution that entails the coupling of input to guide a behavioral output in a behavior space that presents the agent with options. Since this traversing of a path involves a form of selection for action in input-output coupling, and such selection is sufficient for attention given (S), then action implies attention. (Wu, 2014, 90)

In other words, attention is necessary for action because action requires selection, à la Neumann and Allport. I argue against this view in Chapter 6, distinguishing between attention and automatic forms of selection (see also Jennings and Nanay, 2016; Wu, 2018). Wu and others have instead argued in favor of viewing these cases as requiring an effortless, automatic attention: “effortless attention ... is involved in habitual action” (Watzl, 2017, 250).

Finally, Wu has also argued that attention *just is* selection for action – “the *selection for action* account of attention” (Wu, 2014, 6). Yet, there is more to attention than selection for action. As Watzl puts it: “So, is prioritizing just selection for action? No” (Watzl, 2017, 110). In his taxonomy of attention, Ronald Rensink lists many of its perceptual functions, which can operate independently of action (e.g., sampling, filtering, binding, stabilizing, and individuating; Rensink, 2015). As an alternative to selection for action, Rensink introduces a new definition of attention in terms of “global control”: “an attentional process is one that is selective and subject to a particular kind of control ... [This characterization] considers ‘attentional’ any globally-controlled process of limited capacity” (Rensink, 2015). Selection that is subject to global control is an umbrella concept that links the many functions of attention listed above, providing more conceptual breadth than selection for action, which only depends on one form of global control (i.e., the connection between the sensory and motor cortices). Yet, this concept lacks specificity: What exactly is meant by “global”? In the brain, this might include any selective process that involves more than one neural system, only those processes that involve some majority of neural systems, or only those processes that involve certain predetermined “global” neural systems.

In place of global control, one might understand attention to be a process of selection that is within the control of a subject, as I suggest in Jennings (2012). This is the topic of the next, and final section.

## 2.7 Attention and the Self

In this final section I will provide some background for my own take on the phenomenon of attention, which is that attention is prioritization by a subject, or self. While this is not obvious from the above review, the idea that attention is directed by a self is no longer popular. A major claim of this book is that, despite this trend, the self plays a crucial role in attention. As Montemayor and Haladjian put it, “The ‘self’ may be more important than the current theories about attention might suggest, given that reference

to the self is rarely mentioned in studies on attention” (Montemayor and Haladjian, 2015, 76). As we saw in Section 2.1, the question of whether the self directs attention has come up a few times in the history of philosophy: it plays a significant role in debates within Indian philosophy, but is also touched upon by Descartes, Locke, Kant, and Hegel. At the turn of the twentieth century it is picked up again, in the work of William James, who may have been inspired by arguments from F. H. Bradley, among others (see Chapter 3; Bradley, 1886). James, working as both a philosopher and a psychologist, wonders whether attention is an effect on a “brain-cell ... by other brain-cells” or by a conscious self – “the feeling which coexists with the brain-cells’ activity” when it “reacts dynamically upon that activity” (James, 2010). As will be discussed in Chapter 3, James did not come down on one or the other side of the debate: “The last word of psychology here is ignorance” (James, 2010). Yet, the popularity of a physicalist worldview, in which all phenomena are (epistemically or metaphysically) reducible to those addressable by physics, has led to the dominance of the former – the view that attention is a result of interactions between neurons.

One might separate James’ concern into two separate questions: whether attention is a case of mental causation (causation by “the feeling which coexists with the brain-cells’ activity”), and whether attention is a case of mental causation by the self (causation by “the feeling” when it “reacts dynamically upon that activity”).<sup>16</sup> According to Raja Parasuraman, both questions were unresolved as recently as twenty years ago:

Some long-standing issues remain controversial. One issue that has stood since the time of James (1890) is whether attention represents a causal force that influences other activities such as perception (Treisman 1996) or whether it is a by-product of other processes such as stimulus priming (Johnston and Dark, 1986) or competitive neural interactions (Desimone and Duncan 1995) ... What has proven somewhat elusive is the identification of the causal source(s) of attentional effects ... One reason why some researchers might be skeptical could be the feeling that postulating a specialized attentional control area in the brain creates a homunculus in the brain. (Parasuraman, 1998, 12)<sup>17</sup>

In my view, concerns about both the self and mental causation have now taken firmer hold. As I will briefly discuss below, philosophical work on attention largely discards the concept of self and centralized control,

<sup>16</sup> James’ view of the self is one in which “thought is itself the thinker” – the self just is “the feeling” when in a particular role (James, 2010). This is a “thin” conception of the self, rejected in Chapter 3.

<sup>17</sup> The issue of a homunculus is raised often in these contexts (see also van der Heijden and Bem, 1997). I address it in Chapter 3.

often even embracing the “by-product” view, whereas there are some remnants of self and mental causation in the neurosciences, under different terminology.

Contemporary philosophical research on attention eschews the idea of self and centralized control. This work comes in two strands. One strand is inspired by work taking place in psychology, summed up by Harold Pashler: “The role that attentional mechanisms play in perceptual processing does not require a central controller” (Pashler, 1998, 398). In place of a central controller is *distributed* control, which does not require a self. This strand is embodied by philosophers such as Mole, discussed in Section 2.3, and Wu, discussed in Section 2.6, both of whom seem to embrace the by-product view. The other strand is inspired by the debates from Indian philosophy mentioned above. This strand is embodied by philosophers such as Metzinger and Ganeri. As Ganeri puts it:

The concept of *self*, plausibly if not uncontroversially, is a concept of one who is at the centre of this organization of mental space ... The myth one is in danger of falling into is to think that there is *really* something at the centre, some inner individual agent doing the organizing. (Ganeri, 2017, 12)

Philosophers in this strand appear to accept the possibility of mental causation, just not by a self. Yet, talk of a subject remains in some places, even if it is not invoked as a self with causal power. Instead, philosophers talk of “subject-level” phenomena. Wu says, for instance, that we should “treat attention as a subject-level phenomenon” (Wu, 2014, 13), whereas Watzl says that “attention is a subject-level mental activity” (Watzl, 2017, 6). This sense of “subject” is not as a self with causal powers that directs attention, but as a subject of experience (see Chapter 3).<sup>18</sup>

Within the neurosciences, the concept of self and centralized control is still in operation, albeit with different terminology; it is now common to replace control by the self with control by the prefrontal cortex. We can see this, for instance, in two recent volumes on the neuroscience of attention, which both omit “self” from the index, instead discussing cognitive control by the prefrontal cortex:

Although not without controversy, a growing body of data from studies using ERPs, fMRI, and neuropsychology as well as direct cellular recordings have suggested that dorsolateral prefrontal cortex supports control directly. (Carter and Krug, 2012, 96)

<sup>18</sup> Watzl, however, does provide space for the subject as a self with causal powers in a more recent paper (Watzl, 2018).

When two conflicting responses are activated ... the dACC activates, recruiting DLPFC-mediated cognitive control, ultimately resulting in an improvement of performance. (Krug and Carter, 2012, 246)

The idea that the prefrontal cortex is the source of attention was perhaps most clearly put forward by LaBerge:

The mechanisms of attention do not serve as the cause of attentional expressions in cortical pathways. Rather, the causal determinants of what will be attended to, the intensity of attention, and the duration of attention lie mainly in areas of the prefrontal cortex that embody voluntary processes. (LaBerge, 1995, 219)

That these authors see the prefrontal cortex as but one part of a system does not preclude its also standing in for the self or for centralized control. Yet, more explanation is needed to understand how it might do so. In Chapter 3 I provide a role for the prefrontal cortex in control while reigniting the discussion of self as the source of attention.

As is mentioned above, this book enlists a subject-based view of attention. In such a view, selection counts as attention only if it is directed by or within the control of the subject, which clearly separates attention from other forms of selection. How might a subject-based view account for the limitations of attention, described at the start of the chapter? As I will explain in Chapter 3, the power of attention comes from its spatial and temporal scale. Two neural processes occurring at the same time would split that power. Thus, the limitations associated with attention are not absolute ones, in my perspective, but are subject- and context-relative. Yet, progress has been made on approximating those limitations at the subject level; Monica Rosenberg and colleagues have published several articles showing that attention abilities can be predicted from “whole-brain functional network strength,” even absent a specific attention task, showing that attention arises from “the dynamic interactions of many distinct regions of the brain” (Rosenberg et al., 2016, 2017). Importantly, the role of the prefrontal cortex in this whole-brain activity distinguishes it from purely distributed control.

In sum, I think the subject-based approach holds the most promise for understanding the nature of attention as a unified process. This book is thus continuing the work of phenomenologists like Husserl, as well as the many historical philosophers who have seemed to hold a subject-based account. Yet, this is not a work of phenomenology or historical philosophy. As I say in the introduction, I aim to use various resources at my disposal in making my arguments, which include some findings from phenomenology

and historical philosophy as well as from the cognitive and neural sciences. My hope is that by the end of the book I can convince the reader that the everyday sense of attention, as a process directed by the self, can be saved from the encroachment of skepticism and reductionism. Further, by resurrecting this sense of attention we can cast new light on debates ranging from the nature of consciousness to the source of moral and legal responsibility. In the next chapter I will argue that attention points to the existence of a self with causal power, providing a foundation for the subject-based approach.