

## CHAPTER I

*Introduction*

In an increasingly noisy world, many find it difficult to read something as weighty as a book of philosophy. What is the difficulty they face, and what does their facing it mean for them? As this book will make clear, the difficulty is one of *attention*. Attention is a topic of importance in philosophy, with links to some of the deepest philosophical problems, such as whether we have control over our own minds. Yet, in the past century it was largely ignored within analytic philosophy, while the topic of consciousness became central. This book is one of several recent works that have sought to bring attention back into the fray.<sup>1</sup>

What is attention? The word “attention” has its very roots in philosophy; it is first used by Chaucer in translating Boethius, who wrote in the early sixth century about being consoled by philosophy while in prison (“Attend,” 2019). Boethius wrote as though philosophy were personified, and the term “attention” is used to describe something “Philosophy” gathers from Boethius through a temporary silence (“After þis she stynte a litel. and after þat she hadde gadred by atempre stillenese myn attencioun,” [Chaucer, 1868]). This trick of using silence to capture attention is common in advertising, and works due to the contrast between the silence and the target sound – Philosophy’s voice, in this case (Olsen, 1995). Chaucer’s use of “attention” is based on the Latin word for “attend” (“attendō”), which has to do with careful observation, and especially careful listening (Souter, 1968, 200). “Attendō” itself is derived from “tendō,” which has to do with stretching or aiming, as with a bow and arrow (Souter, 1968, 1917–18). I find this to be a good starting point for thinking about attention: attention

<sup>1</sup> These include Brian Bruya’s *Effortless Attention* (2010); Jonardon Ganeri’s *Attention, Not Self* (2017); Christopher Mole’s *Attention Is Cognitive Unison* (2011); Carlos Montemayor and Harry Haroutioun Haladjian’s *Consciousness, Attention, and Conscious Attention* (2015); Jesse Prinz’s *The Conscious Brain* (2012); Sebastian Watzl’s *Structuring Mind* (2017); and Wayne Wu’s *Attention* (2014).

stretches the mind just as one might pull a bow while aiming at a target. As I see it, the attending mind is an active mind, using attention to achieve its aims.

This book uses evidence from multiple disciplines, but especially philosophy, psychology, and neuroscience. It takes the perspective that the mind is a natural phenomenon that can be understood through science, and that philosophy, psychology, and neuroscience are three different ways to explore the mind – through experience and reflection, through behavioral observation, and through the examination of neural phenomena. I see the mind as a set of neural tendencies that can be explored through each of these domains, but which is not reducible to any of them. It is not reducible to neural firing, in particular, because these neural tendencies are based on a context that goes beyond the brain. That is, the mind is the tendency of the brain to seek out and respond to particular stimuli in a particular way given particular background conditions. This perspective on the mind is a version of “nonreductive materialism,” or the view that the mind does not fit within the domain of physics, while nonetheless fitting within the domain of science. I discuss the view at length in Chapter 3.

In line with this perspective, the book offers a new theoretical stance on the concept of attention and how it intersects with other functions of the mind, such as perception, consciousness, and action. In short, it presents attention as an act of mental prioritization by a subject, which is essential for perception, but not consciousness or action. In my view, the subject is that which pulls the bow, to use the ancient metaphor from above. Importantly, this theoretical stance takes seriously the existence of a subject, which separates it from the current trend in philosophy and cognitive science of denying the existence of a subject. This book offers an account of the subject and its role in attention that will both help motivate a subject-centered account and avoid some of the common criticisms regarding its existence. Chapters include: “Attention, Mental Causation, and the Self,” “Attention, Perception, and Knowledge,” “Attention, Consciousness, and Habitual Behavior,” and “Attention, Action, and Responsibility.”

Prior to these chapters is a chapter on the philosophical landscape of work on attention. As is mentioned above, work on attention in contemporary analytic philosophy has taken off only in the past ten years, following a decades-long surge of work in the sciences. I attribute that surge to a recognition that behaviorism could not explain the full spectrum of human behavior, making “attention” a catch-all term for many different internal processes. In recent years, scientists have discovered that some of these processes are explicable in terms of low-level biological function

and resource management (e.g., neural tuning), whereas others are not explicable in these terms (e.g., top-down attention). For this reason, scientists speak of different forms of attention, including top-down, bottom-up, endogenous, exogenous, spatial, and feature-based attention. In philosophy, much of the recent work has centered on whether there is a unifying concept of attention, and what it might be. The perspective of this book is that there is a unifying concept of attention, but that some processes labeled “attention” share some of its attributes without constituting attention. As stated above, the unifying concept used in this book is that attention is mental prioritization *by a subject*. Most other accounts of attention within philosophy describe what attention is like (e.g., concentrated) or what it is for (e.g., action). This account defines attention through its source – the subject.

Yet, what is this talk of a *subject*? The word “subject” is used in contrast with “object,” mirroring the use of these terms to describe parts of speech. An object is something observed and manipulated by a subject. I move my fingers over the keys of a keyboard to produce changes to an electronic document corresponding to changes on my screen – the start of a book. You move your eyes over a page ultimately produced by this electronic document, accessing meaning through our shared language. The keyboard, the electronic document, the screen, the page, the shared language – these are all objects. In this scenario, you and I are the subjects observing and manipulating these objects for our own purposes. While the distinction is sometimes described in terms of the presence or absence of consciousness, it is more fundamentally conceived in terms of causal power: an object is a recipient and conduit of change, whereas a subject is a source of change. At least, this is the way we use the terms as parts of speech. In this book I argue for a notion of the subject that helps to explain the intuition that a subject can be a source of change, or something with causal power.

What is the evidence for the existence of a subject? The primary evidence is experiential – we experience being a source of change, as when we make an effort to change our behavior. Of course, this kind of evidence could be illusory, which is one reason to examine secondary and tertiary evidence. The secondary evidence is observational – in observing the behavior of others we can identify behavior that corresponds with effort on the part of a subject, but we can also identify behavior that corresponds with an absence of effort. Careful observational tools developed in the psychological sciences have allowed us to improve this identification of so-called “active” and “passive” behavior. The tertiary evidence is from

neuroscience and physiology – we find a natural divide between the physiological and neuroscientific evidence that corresponds with effort, whether reported by the subject or observed in the subject’s behavior, from that which corresponds with an absence of effort. All three types of evidence, taken together, point to the existence of a subject as a source of causal power.

A hotbed for evidence on the existence of the subject is the case of attention. The rich history of research on the topic of attention has occurred through numerous different understandings of the concept, but a core theme in these different uses is that attention involves a directing of the mind. Recall that the concept of a subject is rooted in the power for behavioral change. Connecting these concepts, directing one’s own mind through attention is often the first step toward changing one’s behavior. When we make an effort to change our behavior, we start by directing (or redirecting) our attention, as when the child looks away from the marshmallow he or she is tempted to eat but wants to avoid eating. When we want others to make an effort to change their behavior, we ask them to “pay attention,” as when a teacher asks a child to turn their attention from a window to the classroom. We speak of an “attention deficit” when someone seems unable to change their behavior in this way. Since the ability to change one’s behavior through effort is the calling card of a subject, and attention is a key component of such change, attention is a natural place to look for the role of the subject.

Thus, this book focuses on the attending subject – someone capable of behavioral change through mental direction. While one chapter of the book covers the metaphysics of attention – e.g., how is it that a subject has causal power? – most of the book is dedicated to the downstream effects of attention – e.g., what is the influence of an attending subject on perception, consciousness, and action? The book has seven total chapters: an introduction, a review of the literature on attention, four main chapters, and a conclusion. The review of the literature can be skipped by most readers, but is intended to situate those who would benefit from a general overview. Each of the four main chapters presents a theoretical stance on an issue involving attention. While these can be read independently, they are intended to be read in order and do make some reference to prior material. As is mentioned above, these include a chapter on attention, mental causation, and the self; a chapter on attention, perception, and knowledge; a chapter on attention, consciousness, and habitual behavior; and a chapter on attention, action, and responsibility. In sum, the main claims of these chapters are, in order:

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- attention is evidence of an emergent self with its own causal powers (Chapter 3);
- attention supplies meaning for conscious perception and so is necessary for perceptual knowledge (Chapter 4);
- attention is not necessary for consciousness, calling for a new conception of consciousness (Chapter 5);
- and attention is not necessary for action, forcing us to revise traditional theories of action and responsibility (Chapter 6).

Thus, each main chapter aims to include a significant theoretical contribution. In building to these contributions I have provided some intellectual history on each topic, with the assumption that this background will better enable the reader to grasp the foreground of my ideas. That is, I see my role as helping the reader to perceive the world in a new way, and, as I will argue in Chapter 4, perception relies on the distinction between foreground and background. In this case, perceiving the world in a new way requires presenting not only my own ideas, but related ideas that have inspired them.

This project began over ten years ago. In 2006, my first semester of graduate school, I read David Chalmers' book, *The Conscious Mind*. Something about it got under my skin, and as a result I became more involved in the philosophy and science of mind.<sup>2</sup> Attention soon became my bread and butter. With this book, the culmination of many years of work on the project, I hope to convince the reader that attention is as important a topic to philosophy as consciousness. Like consciousness, the philosophical issues connected with attention are old ones. It is my aim to advance debate on these issues. Yet, if the book does no more than get under the skin of some readers, helping them to find new problems and solutions in this domain, then I will be content.

<sup>2</sup> In early 2007 three things set this project in motion: I began organizing workshops on neuroscience and philosophy with a friend, including one by Ned Block on consciousness and attention; I took two courses, one on the philosophy of perception with Susanna Siegel and Alex Byrne, and one on the psychology of perception with Takeo Watanabe; and I applied for a conference and made my first poster presentation, arguing that gist perception is sometimes modulated by attention, against claims by Christof Koch and Naotsugu Tsuchiya.

## CHAPTER 2

*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 variableness, 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 “inattentional blindness” (see Section 2.4; Chapter 5), claim to have found mention of the phenomenon in Aristotle:

The phenomenon we have called inattentional 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).