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Review of Wayne Wu's *Attention* (2014)

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Wayne Wu's *Attention* (2014) is a perspicuous, thorough, and even-handed survey of current views of attention in mainstream philosophy and cognitive science. That last qualifying phrase is important: readers looking for a more comprehensive historical, philosophical, or scientific treatment may be disappointed, as the bulk of the literature discussed by Wu comes from analytic philosophy of the past twenty years, and all debates are framed by a standard computational and representationalist approach (see pp. 42, 46–50). This means, for example, no contributions from the continental phenomenological tradition (e.g. Husserl), no mention of alternative, non-representational theoretical frameworks such as ecological psychology (Chemero 2009), and very little attention to new scientific research on attention and neural synchronization (Aboitiz and Cosmelli 2009). But what Wu covers, he covers very well, and he is admirably straightforward about the unsettled issues of attention research. His clear-cut analyses of empirical and theoretical issues leave the door wide open to other approaches, so that even readers who disagree with his approach will find

their views challenged and sharpened. Thus, because he aims to move the conversation forward rather than explain attention once and for all, Wu's book succeeds in spite of its limited scope.

Furthermore, by helping to advance our understanding of attention, Wu shows how to make progress on seemingly intractable questions related to consciousness. An investigation of the nature of attention inevitably leads to questions about the relationship between attention and consciousness. Wu's investigation begins with a passage of William James, whose lucid observations so often serve as reference points for psychology and philosophy:

> Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration, of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others, and is a condition which has a real opposite in the confused, dazed, scatterbrained state with in French is called distraction, and Zerstreutheit in German (1890, p. 403; cited in Wu 2014, pp. 3–4).

Note that this passage takes for granted a basic but crucial point, namely that consciousness and attention are closely related but not the same. By pointing out the fact that attention is a "condition" that has an opposite (distraction), James establishes consciousness as the wider phenomenon: we do not attend to everything that we experience. Wu, however, argues that there are cases of attention that lie outside consciousness—for instance, as demonstrated by experiments with subjects with blindsight (selectively impaired visual fields) who are able to "attend" to objects that do not enter their visual experience (pp. 112–114). Following common sense, some readers may wish to define attention so as to exclude such cases. Yet doing so requires a definition of both attention and consciousness that shows why the former belongs exclusively to the latter.

Wu's methodical probing of such questions is what makes this book so useful to consciousness studies. As revealed by Wu's analysis, attention is a rather complex topic, yet this very complexity allows us to refine the

questions that we ask about consciousness. Moreover, attention is much more tractable than consciousness taken by itself: it is (relatively speaking) easier to define phenomenologically and functionally, and thus easier to analyze and investigate experimentally.

How should we describe attention, then? Most approaches divide attention into dichotomies—variously called top-down vs. bottom-up, endogenous vs. exogenous, goal-directed vs. stimulus-driven, controlled vs. automatic, voluntary vs. involuntary (pp. 29–38)—and this two-part division seems to correspond to two partially segregated neural systems (p. 28). However, none of these divisions are clear-cut (if you look for something, the eventual appearance of that object is the result of both goal-directed and stimulus-driven attention) and, moreover, they overlap with one another in various ways. Wu helpfully distinguishes between two main "dichotomies" of attention—(1) how attention gets initiated (active vs. passive or top-down vs. bottom-up) and (2) how the shape of attention evolves once it begins (controlled vs. automatic)—and then details how these two dichotomies combine in various ways (pp. 34–38).

However, these fine distinctions are not sufficient to define attention—indeed, if anything, they make it harder. How can we hold together all the varieties of attention (top-down, automatic, etc.) as a single phenomenon? Wu notes that all experimental studies elicit attention by asking the subject to perform some task, and that this necessary condition for empirical study serves as an "initial foothold in the face of skepticism about what attention is" (p. 40). Thus Wu's proposal—and perhaps one of the book's most important contributions—is that attention is always task- or action-oriented. In his own words,

> If subject S selects X for some action A, then S attends to X (p. 83).

This simple definition may be incomplete, but it has a number of virtues worth noting. First, it registers that attention is selective, but also that selection alone is not sufficient to define attention (e.g. a semipermeable membrane is selective, but that doesn't mean that it pays attention to what

it admits). Also, as a preliminary guide for inquiry, Wu's definition is appropriately vague in a number of respects, including: 1) whether selection for an action must be perceptual; 2) whether selection must be conscious; 3) whether selection entails cognitive access (working memory); 4) what kinds of action are selected for (e.g. reasoning); 5) what selection entails and how it works; 6) what are the distinctive phenomenological effects (if any) of selecting for action.

In the book's fourth chapter, Wu takes up this last question, the phenomenology of attention. He first considers the possibility that consciousness is essential for attention, and decides that the evidence shows that it is not (pp. 112–114). However, this conclusion does not preclude the possibility that attention within conscious experience is associated with a characteristic phenomenology. Wu considers several proposals for distinct attentional effects on visual experience, including contrast, determinacy, salience, and structuring, and finds the evidence compelling but inconclusive. Nevertheless, the possibility of making real progress in attentional phenomenology seems within reach, and this possibility has important implications for the phenomenology of consciousness.

Another area in which real progress seems likely is the study of inattentional blindness (chapter 5, pp. 146–175). The phenomenon of inattentional blindness has been the subject of many prominent studies (such as the famous "Monkey Business Illusion," see p. 153), but, as pointed out by Wu, our theoretical and phenomenological grasp of this commonplace phenomenon is still rather shaky. Specifically, we do not know if this "blindness" is best described as 1) a "phenomenal hole" in the visual field; 2) a failure to individuate features or objects; 3) failure to categorize an object; or 4) failure to remember visual stimuli (working memory). Similar questions are raised by the equally commonplace phenomenon of "gist perception," which is basically the flipside of inattentional blindness: perception of only the basic meaning of a perceptual scene or object. In both cases, exactly how do we experience the parts that do not fully "register"? Are they entirely absent? Are they present but indeterminate? Are they fully determinate but unrecognized? Are they recognized but forgotten?

Deciding among these and other alternatives brings us back to phenomenology, but it also points to the underlying dynamics of attention.

It is on the level of the mechanisms of attention that the limitations of Wu's approach are most apparent. As already noted, Wu embraces a particular model of perception—not just a computational, representational model, but what could be termed a "processing hierarchy" model (e.g. Marr 1982), which construes perception as a serial process that builds from the detection of simple features to the construction of complex meanings. This model constrains Wu's approach to attention in a number of ways. For instance, with regard to the neural dynamics of attention, Wu only barely acknowledges mechanisms beyond the level of the individual neuron, virtually ignoring relevant research on group-level neural synchronization and its relation to individual-level mechanisms of selective gain (Bosman and Womelsdorf 2009). Wu's excuse is that synchronization is a new area of research and so its functional contribution to attention is still unclear (see pp. 73–74). However, one could argue that the theoretical implications of new research are precisely the sort of questions that should be explored by a philosophical treatment of attention. More pointedly, what needs to be considered is how the influence of group-level, widely distributed mechanisms of attention might challenge the aforementioned "processing hierarchy" model of perception, which seems wedded to the idea that attention is a mechanism of information "gatekeeping" that intervenes at one or more levels of the processing hierarchy. Insofar as this idea constrains Wu's formulation of issues relevant to attention (e.g. attentional dichotomies, phenomenology, inattentional blindness), the possibility of attentional mechanisms that work across "levels" to alter the receptivity of individual neurons would seem to be of fundamental importance. Indeed, the basic concept of attentional selectivity might need to be amended in light of this research: whereas the idea of "gatekeeping" implies that attention acts as a filter that restricts the flow of sensory information toward higher stages of processing, other approaches (e.g. ecological, enactive) might attribute to attention a more fundamental role in the dynamics of the perceptual system as a whole, such as the constitution of information as such. That

is to say, perhaps attention plays a role in the very determination of perceptual content as such, and not just its selection for action (although selection for action might still be an important normative principle for the determination of perceptual content).

Another possible consequence of Wu's attachment to Marr's theory of perception is his acceptance of the standard experimental focus on attention in highly controlled, artificial settings (Aboitiz and Cosmelli 2009). He does not consider, for instance, the vast literature on attention and effort (e.g. Bruya 2010), which focuses on how we manage limited attentional resources when performing demanding tasks. Even more surprisingly, while Wu devotes several chapters to the role of attention in higher reasoning (e.g. demonstrative thought, doxastic justification), he largely neglects possible experimental approaches to the role of attention in the performance of complex motor tasks. Granted, Wu's action-oriented definition of attention is intended to encompass both motor tasks and thought, but given the priority of attention for motor skills (in evolution, and possibly also in development), not to recent emphasis in cognitive science on "embodiment," i.e. the basis of higher reasoning in bodily experience, it seems appropriate first to develop our theoretical understanding of attention within the sphere of motor control. For instance, Wu's definition of attention as selection for action seems poised for application to attentional skills in sports (e.g. how to catch a fly ball), but this promise is left unrealized.

Even so, Wu's contributions outweigh the shortcomings of his approach. In fact, one might say that one of his most important contributions is to present a particular theoretical approach to attention with such rigor and clarity that its shortcomings can be exposed to criticism. Rival theories of perception and attention now have a wonderfully clear target on which to set their sights. Let's see if they can do better.

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