



Sensory integration and the unity of consciousness

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Sensory integration and the unity of consciousness, edited by David J. Bennett and Christopher S. Hill, Cambridge, MA: MIT Press, 2014, 424 pp., \$45.00 (hardback), ISBN: 9780262027786

Based on but not limited to material from a conference at Brown University in 2011, *Sensory Integration and the Unity of Consciousness* is an ambitious collection that brings together two distinct but intertwined topics.¹ In what follows, I briefly explain what sensory integration and the unity of consciousness amount to, highlight the contents of the papers, and finally end with general observations and suggestions. I will spend more time on sensory integration, since it is relatively unfamiliar terrain in philosophy.

“Sensory integration” can refer to several phenomena that have been studied by psychology and cognitive neuroscience. First, it can mean *cue combination*, the phenomenon whereby perceivers can detect single properties by combining information from a variety of information channels. The perceptual system takes a weighted average of estimates from these sources, with weights proportional to the reliability of the sources in question. Second, it can mean *cross-modal interactions*, one paradigm example being the McGurk Effect: dubbing the phoneme /ba/ onto the lip movements for /ga/ produces a percept of the phoneme /da/ (McGurk & MacDonald, 1976). The sound-induced flash illusion is another prominent case (Shams, Kamitani, & Shimojo, 2000). There are also versions of *binding problems*: how do we detect multiple properties through disparate neural processes in a way that results in experiences of those properties as bound to the very same object? Temporal factors makes things more complicated: varieties of sensory information travel from separate channels with different distances and speeds, but the resulting percepts do not seem to be temporally disjoint in most cases. *Common sensibles* are a third kind of sensory integration. For example, both sight and touch detect spatial properties, but there is a question concerning whether there are amodal representations underlying both of them. This is not the place to elaborate on these different kinds of sensory integrations; the papers in this volume provide very detailed discussions of them. I shall now turn to the unity of consciousness.²

Like sensory integration, there are different kinds of unities of consciousness, the most discussed ones being phenomenal unity (Bayne & Chalmers, 2003) and representational unity (Tye, 2003). Very often, we have multiple experiences from different sense modalities simultaneously, such as tactile experiences of touching keyboards and auditory experiences of listening to music at the same time. Many argue that these experiences are *phenomenally* unified. Exactly how we can characterize this idea is itself a challenging issue. According to many philosophers, experiences have representational contents, so a parallel notion of *representational* unity in terms of content can be formulated. There is a further question as to whether one is explanatorily prior to the other. Following the representationalist tradition, some have argued that representational unity can be invoked to explain phenomenal unity

(Tye, 2003). I shall not dwell on this point: the chapter by Robert Van Gulick provides a nice overview of the varieties of unity of consciousness.

I now turn to some highlights of the individual chapters. For part 1, I recommend an alternative way of organizing the chapters for the reader. To begin, chapter 1, “Bayesian Modeling of Perceiving: A Guide to Basic Principles,” naturally goes with chapter 10, “Modeling Multisensory Integration.” Both are mainly empirical, with the latter offering more details. Chapter 1 nicely discusses the relevance of *philosophy of perception*; this ensures that the reader does not lose sight of philosophical questions in the relevant empirical details. An obvious philosophical topic is the famous “Molyneux’s Question,” which asks whether a person born blind and later made to see would be able to recognize by vision alone the shapes of objects formerly recognized by touch. At least under certain formulations, this is an empirically testable question. Held et al. (2011) is the most recent effort to test this question empirically. Chapter 8, “Establishing Cross-Modal Mappings: Empirical and Computational Investigations,” begins by reviewing this study and makes additional theoretical points. Chapter 9, “Berkeley, Reid, and Sinha on Molyneux’s Question,” emphasizes different formulations from a historical point of view, and ends with some interesting questions for the authors of chapter 8. This thread has been taken up in a series of discussions on *i-Perception*, including Cheng (2015), Connolly (2013), and Schwenkler (2012).

Like Molyneux’s Question, issues concerning synesthesia also have rich philosophical implications. Chapter 3, “The Long-Term Potentiation Model for Grapheme-Color Binding in Synesthesia,” and chapter 7, “Can Blue Mean Four,” focus on several issues in this field. Synesthesia comes in many varieties, and there are debates about how exactly we should classify them. Given the varieties, papers need to focus on specific kinds. Both chapter 3 and chapter 7 focus on grapheme-color synesthesia, one of the most common varieties. While the former provides a model—long-term potentiation—to explain its underlying mechanisms, the latter connects it to traditional issues concerning representational content: it argues that perceptual experiences can sometimes represent numerical values.

The remaining four chapters in part 1 all focus on varieties of sensory integration or binding more explicitly. Chapter 2, “The Multisensory Nature of Perceptual Consciousness,” argues against the decomposition thesis—the idea that “a person’s overall perceptual experience can be identified with the sum of his or her modality-specific experiences” (p. 15)—from considerations concerning both the unity of consciousness and multisensory integration. Chapter 4, “Intermodal Binding Awareness,” argues that intermodal feature-binding awareness exists. This targets Matthew Fulkerson’s (2011) idea that there is *only* intramodal feature-binding awareness. This is especially interesting because Fulkerson has further developed a positive account of the sense of touch—the unity of touch—in his recent (2014) monograph, and this account crucially relies on the view he develops in the 2011 paper. This is so because any account concerning the unity or disunity of sense modalities crucially hinges on individuation conditions of the senses, and the inter-/intra-modal distinction is one important aspect of this individuation. Chapter 5, “The Unity Assumption and the Many Unities of Consciousness,” distinguishes between object unity, crossmodal binding, and multisensory integration, which have not been clearly distinguished in the recent literature. The main critical target here is the neo-Humean view that “multisensory integration never leads, or is never accompanied by, a unified experience” (Spence & Bayne, 2014). Chapter 6, “Multimodal Unity and Multimodal Binding,” distinguishes between additive binding and integrative binding. The target of analysis is the multimodal binding parameter. Two prominent hypotheses—the spatial hypothesis and the sortal hypothesis—are rejected in favor of the proto-object hypothesis.

Now let’s turn to part 2. Here I shall mainly follow the existing order since the aim of these chapters is rather homogeneous: they all aim at clarifying the different kinds of unity of consciousness and providing positive accounts (or at least suggestions for furthering the debates). Chapter 11, “A Unity Pluralist Account of the Unity of Experience,” argues for unity pluralism by identifying many sensory unity-making relations. Chapter 12, “Unity, Synchrony, and Subjects,” begins from an interesting discussion of Brentano’s relevant thoughts. This is part of the author’s recent project of linking the unity of consciousness and the self. It is argued that “a subject of experience just *is* a collection of capacities for experience” (p. 268). Chapter 13, “Experiences and Their Parts,” mainly consists of

an account of the part/whole structure of experience. The author focuses on taxonomizing different views and explicating their commitments. Chapter 14, “Unity of Consciousness: Advertisement for a Leibnizian View,” contrasts the view that “the most fundamental fact that grounds unity is a form of singularity or oneness” with the inverse view that oneness is *not* explanatorily prior; the author favors the latter view. Chapter 15, “Partial Unity of Consciousness: A Preliminary Defense,” focuses on the significant split-brain consciousness debate and distinguishes between the partial unity model (PUM) and the conscious duality model (CDM). The author provides a case for PUM. Chapter 17, “Counting Minds and Mental States,” takes considerations beyond the split-brain case into account and argues for CDM. Chapter 16, “*E pluribus unum*: Rethinking the Unity of Consciousness,” begins with an etymological analysis of the term “conscious”—which is derived from the Latin “conscio” and means “know *together*”—and then moves to discussions of the varieties of unity, including representational, object, subject, introspective, access, and phenomenal unity. The author concurs with Bayne’s (2010) virtual self view and develops an argument for a “deep connection between phenomenal unity and representational unity” (p. 390) that is different from Tye’s (2003) representational conception.

I will end with two general observations. Firstly, the two main topics of this book are distinct though intertwined in many ways. Many of the papers collected here more or less exclusively focus on sensory integration or on the unity of consciousness. As the editors implicitly acknowledge (the division of the book being “*mainly* on sensory integration” and “*primarily* on the unity of consciousness”), the two topics admit of various connections that readers can readily discover, but it would have been helpful to have a general introduction to convince less sympathetic readers that these two sets of topics should be considered together, at least theoretically. The editors do briefly touch on this in the preface, but it is far too brief to serve this purpose. Secondly, the two main topics of this book are treated in a way that is not spread evenly between philosophy and science, both in this volume and in general. I agree with the editors’ decision that part I should have more scientific contributions, while part II should be more purely philosophical. Still, there is no obvious a priori reason why this should be so. Moreover, the actual ratio exemplified in this volume exaggerates the difference: while in part I (sensory integration) the ratio of philosophers to scientists is 10:7, part II (unity of consciousness) has eight philosophers but no scientists. To be sure, in this kind of terrain the distinction between philosophy and science is blurry, so the mere fact that all authors in part II are philosophers does not imply that scientific considerations are entirely absent. For example, Elizabeth Schechter’s chapter contains an excellent discussion of the split-brain consciousness debate. Still, it would be more satisfying to have more voices from the sciences contributing to the topic of part II. It is an open question what the empirical import is for issues concerning the unity of consciousness. Philosophers and scientists in the mind and brain sciences have a collective responsibility to explore this question, and if there is little empirical import to discussions concerning the unity of consciousness, then we should be able to explain why this is so.


Notes

1. The conference information can be found here: http://networksensoryresearch.utoronto.ca/Brown-Unity_of_Consciousness.html.
2. Here I have greatly benefited from David J. Bennett’s introductory remarks at the conference in 2011.

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