Stephen E. Palmer and Arthur P. Shimamura, eds. *Aesthetic Science.* New York: Oxford University Press, 2012, xii + 408 pp. ISBN 978-0-19-973214-2

Around the turn of the millennium, brain scanners seemed to be changing the world. Access to MRI machines became easier, data analysis methods became more standardized, and researchers from an increasingly diverse range of academic backgrounds began turning to the tools of neuroscience to find answers to the hard problems that had plagued their disciplines for years. As a steady stream of colourful images of the brain 'lighting up' began to issue from the labs of the world, it seemed increasingly likely that we would finally get some answers to the deep questions of not only psychology and cognitive science, but also fields like anthropology, economics, linguistics, and the study of religion. Due in large part to Semir Zeki's *Inner Vision: An Exploration of Art and the Brain* (1999), art also became a field of neuroscientific study, and the field of neuroaesthetics was born, combining the disciplines of aesthetics, psychology, and neuroscience. It was an exciting time.

As the intervening decade has shown, taking a scientific approach to the study of art and aesthetics is not impossible, nor is it easy (nor, in fact, is it revolutionary, since empirical research on the psychology of art had been going on for quite some time). In *Aesthetic Science: Connecting Minds, Brains, and Experience*, the editors Arthur P. Shimamura and Stephen E. Palmer take a step back and invite scholars from precisely these three disciplines, aesthetics, psychology, and neuroscience, to comment on the state of the art. In the essays collected in this volume, the authors dissect the challenges and sketch the possibilities of a science of aesthetics. As befits a field that has now had a chance to get its hands dirty, the view presented in *Aesthetic Science* is no longer the giddy one of ten years ago; the collective voice of these authors is that of a wiser researcher whose optimism has been tempered with reality, and who is now getting down to the hard work of research.

Shimamura writes that the contributors to the book were asked to 'address the potential of an *aesthetic science*' (p. 4). The name 'aesthetic science', the editors explain, is inspired by 'cognitive science', another interdisciplinary venture. The book is divided equally into three sections, which approach the question of the feasibility of an aesthetic science from the points of view of philosophy, psychology, and neuroscience. Some chapters address the thesis more directly than others, but all contribute to a broad and multi-faceted picture of the current debates, problems, goals, and possibilities of an aesthetic science.

Art, aesthetics, and the aesthetic response comprise a vast area of fascinating questions and potential research. To retain some degree of coherence in the book, Shimamura and Palmer choose to focus primarily on the visual arts and on the experience of the beholder. This is a wise choice. When this rather narrow focus is combined with the breadth of research backgrounds the authors represent, the reader comes to see the same problem from several different viewpoints, and develops a better understanding of the issues and challenges at hand.

As one might expect from a book focusing on the visual arts, *Aesthetic Science* has illustrations and contains a collection of colour plates in the middle of the book. The plates are a combination of art reproductions and colour illustrations from scientific publications, primarily functional magnetic resonance imaging (fMRI) images. This has the strange effect of making the fMRI plots appear more like art objects themselves, rather than what they actually are, which is graphs of levels of statistical significance plotted on an image of the brain; although I assume this was unintentional, I found it to be an enjoyable side-effect.

The division of the essays into three sections, each with its own theoretical approach, works well. Not only does this editorial decision help organize the material, it also has the effect of highlighting the continuing challenge of merging distinct research traditions. Psychology and cognitive neuroscience already have much in common, since much of cognitive neuroscience (especially in the early days) has consisted of transferring ideas and paradigms from experimental psychology into the scanner. The odd man out in this trio, interestingly enough, is aesthetics itself, the discipline which ought, one would think, to be at the heart of the aesthetic scientific endeavour.

Although all three sections do a good job of portraying their respective approaches to aesthetic science, I found Part I, 'Philosophical Perspectives', particularly compelling, because it highlights the nuances and subtleties of the questions that aesthetics has been grappling with for thousands of years. These are not easy questions, and it would be naive to think that they will yield quickly or easily to any approach, empirical or theoretical. To make them testable, empirical science is often forced to simplify lofty ideas; although this will continue to be a necessity for aesthetic science, the first section of the book serves as a reminder that empirical science's oversimplified operationalization of aesthetic theory should not be divorced from that theory, nor should it be mistaken for aesthetic theory. It can be useful to use galvanic skin response (GSR) to measure arousal as an aid in understanding a component of the aesthetic response, for instance, but it would be a mistake to interpret that arousal as the response itself. It is but one of many possible indicators of the response, and can only be interpreted in the light of a more comprehensive theory of the psychology of aesthetics.

Because the book consists of a collection of essays, each chapter has its own character and writing style. This adds to the value of the book, underscoring the diversity of the academic backgrounds and traditions of the researchers who share a common interest in combining science and aesthetics. Although the book is written in a way to be accessible to non-experts, the style throughout is academic. Unlike many popular-science books, the chapters are carefully referenced, and endnotes are placed at the end of each chapter rather than at the end of the book, adding to the impression that this is a publication with academic, rather than popular, ambitions.

Despite the many perspectives offered in the book, the authors all return to the same key questions: what should the object of aesthetic scientific investigation be, what should the theoretical framework for aesthetic scientific investigation be, and what are the most appropriate tools for the job?

Of these questions, the third is the easiest to answer: all options are still open. Unlike other scientific disciplines that are closely tied to particular tools, aesthetic science is free to be fairly promiscuous in its choice of methods. Eye-tracking, surveys, button-press reaction time, fMRI, electroencephalography (EEG), GSR, and field observations: all of these and more are legitimate tools for the scientific study of the human response to art.

The first question, what the object of aesthetic scientific study should be, is a little trickier. In Chapter 1, 'Toward a Science of Aesthetics', Shimamura offers a model of the transmission of the artist's intention, through the work of art, to the experiencer. In the experiencer, Shimamura distinguishes three components: sensation, knowledge, and emotion. Which of these should aesthetic science focus on? Should it be the effects of particular techniques on the experiencer, such as the use of manipulation of spatial frequency employed in the *sfumato* technique as described by Noël Carroll, Margaret Moore, and William P. Seeley in Chapter 2, 'The Philosophy of Art and Aesthetics, Psychology, Neuroscience: Studies in Literature, Music, and Visual Arts', and the 'peak shift' effect described by Vilayanur S. Ramachandran and Elizabeth Seckel in Chapter 16, 'Neurology of Visual Aesthetics: Indian Nymphs, Modern Art, and Sexy Beaks'? Or should the focus be on what the observer brings to the image, as in an experiment described by Ulrich Kirk in Chapter 13, 'The Modularity of Aesthetic Processing and Perception in the Human Brain: Functional Neuroimaging Studies of Aesthetics', in which original paintings were used as stimuli, but presented to participants as either coming from an art gallery or being computer-generated, thus manipulating the viewer's expectations?

These questions lead directly to the second and thorniest of the three recurring themes in *Aesthetic Science*: what should the theoretical framework for aesthetic

science be? This is the central issue that haunts the field, and which appears either explicitly or implicitly in every chapter of the book. Aesthetic science, like any science, seeks to generate empirically testable hypotheses on the basis of observation. Generating a hypothesis requires more than observation, however: it requires a theory, or at the very least a working model. From reading the essays collected in this volume, it is clear that aesthetic science, as a discipline, has not yet settled on an overarching research paradigm.

Several of the book's authors refer to Semir Zeki. As one of the early standard-bearers for neuroaesthetics, he is a natural touchstone. As Anjan Chatterjee notes in Chapter 12, 'Neuroaesthetics: Growing Pains of a New Discipline', Zeki has 'argued forcefully that no theory of aesthetics is complete without an understanding of the role of the brain in aesthetics' (p. 300). Vincent Bergeron and Dominic McIver Lopes point out in Chapter 3, 'Aesthetic Theory and Aesthetic Science: Prospects for Integration', that this is, on the face of it, a position that almost no one would dispute. What is more debatable, they continue, is whether detailed understanding of brain function is sufficient to explain aesthetic response. Can Zeki illuminate the aesthetic experience by explaining it in terms of the modularity of the visual system? Yes, perhaps, argue Bergeron and McIver Lopes, but only if one accepts Zeki's very particular definition of what needs to be explained by aesthetic science. Tying the *explanandum* as closely to the functioning of the visual system as Zeki does allows for parsimonious scientific explanations of aesthetic phenomena, but severely limits the range of phenomena that can be investigated.

It is worth dwelling for a moment on the more radical view that research into the brain states associated with the aesthetic experience will provide us with a complete understanding of that experience. In more general terms, this is the claim that understanding humans at the level of the brain will be tantamount to understanding humans at the level of behaviour. Although this is in one sense trivially true (certainly our behaviour is the external manifestation of internal brain states), in another sense it is deeply unsatisfying, and would, to my knowledge, be without historical parallel. After many years' research on memory, for instance, including many experiments mapping aspects of the memory function onto specific regions of the brain, and even probing memory at the cellular level, we cannot yet claim to *understand* completely what memory is, and indeed can only make sense of the results of the brain data as they relate to observable behaviour. Although an understanding of the neural underpinnings of memory is without doubt a critical part of a full theory of memory, it is not sufficient in and of itself. As Murray Smith writes in Chapter 4, 'Triangulating Aesthetic Experience', it is fallacious to think that 'brain activity speaks for itself' (p. 100).

So if one agrees that an understanding of the neural basis of aesthetic experience is important for a full understanding of that experience, how should an aesthetic scientist design meaningful experiments? Among the many hints sprinkled throughout the book, there are two that I will mention here.

The first is expressed by Paul J. Silvia in Chapter 10, 'Human Emotions and Aesthetic Experience: An Overview of Empirical Aesthetics', in which he calls for an overarching theory of aesthetic response. In his essay, Silvia reviews several of the more influential proposals, and also argues for one approach in particular: an *appraisal* approach, which puts emphasis on the individual differences of the viewers, rather than on the physical features of the work of art. But the main thrust of Silvia's essay is not so much to argue for the adoption of the appraisal approach, as it is to emphasize the need for some form of consensus, at least temporarily, on a common research paradigm. This desire for common ground is echoed throughout the book. Agreeing on how to proceed will be the critical next step for the field.

How should the field of aesthetic science arrive at this common ground? The second idea, triangulation, articulated by Smith, in Chapter 4, suggests a process of gradual refinement. In essence, triangulation is the idea that the researcher should use all available means to investigate a phenomenon and, critically, allow the different levels of investigation to inform one another. Theories of aesthetic response can be informed by theories of cognitive function in general, which can in turn be informed by an understanding of brain function. Likewise, understanding brain function will require putting that function in the context of what is known about cognitive function, which in turn should be informed by an understanding of behaviour, and of the phenomenology of the aesthetic experience.

The science of aesthetics is unavoidably a contentious meeting ground of empirical scientists and scholars of aesthetics, who approach the common object of study from very different perspectives. Scientists will need to be open to, and understand, the perspective of aesthetics, and scholars of aesthetics will need to be open to the methods of science. The primary contribution of the book under review is to bring these diverse opinions together under one roof. If aesthetic scientists cannot always talk directly with one another yet, at least by reading this book they may overhear what the others are saying.

Aesthetic Science is an important contribution to the field, although in this respect the book has it easy, since the field of aesthetic science is so new that very few books have been published on the subject. This is not to say that a good deal of research has not been devoted to the topic, as the book richly illustrates. *Aesthetic Science* will likely play a key role in defining the field of aesthetic scientific

research for the next decade. The issues raised by the contributors are not resolved, nor will they be any time soon. These are fundamentally difficult topics that have plagued and teased thinkers forever: What is the nature of beauty? How and why can we respond simultaneously to the same object with revulsion and attraction or appreciation? What is the link between art and emotion? Why do we make and consume art? The book answers none of these questions, but draws on the insights of aesthetic thinkers to crystallize and reframe them for renewed discussion, using the scientific methods of research of the twenty-first century. It is still an exciting time.

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