

The Psychology of Visual Art

What can art tell us about how the brain works? And what can the brain tell us about how we perceive and create art? Humans have created visual art throughout history and its significance has been an endless source of fascination and debate. Visual art is a product of the human brain, but is art so complex and sophisticated that brain function and evolution are not relevant to our understanding? This book explores the links between visual art and the brain by examining a broad range of issues including: the impact of eye and brain disorders on artistic output; the relevance of Darwinian principles to aesthetics; and the constraints imposed by brain processes on the perception of space, motion and colour in art. Arguments and theories are presented in an accessible manner and general principles are illustrated with specific art examples, helping students to apply their knowledge to new artworks.

George Mather is Professor of Vision Science in the School of Psychology at the University of Lincoln. He has over twenty-five years of experience in teaching courses on human visual perception and the psychology of visual art to undergraduate and postgraduate students and he is the author of *Essentials of Sensation and Perception* (2011), *Foundations of Sensation and Perception* (2009) and *The Motion After-Effect: A Modern Perspective* (1998; co-edited with Stuart Anstis and Frans Verstraten).

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George Mather

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Eye, Brain and Art

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Preface

The opportunities for people to engage with visual art are greater now than they have ever been before. In recent years, increasing numbers of people choose to attend major international gallery exhibitions that celebrate visual art both past and present, often at significant cost in terms of time and money. Most houses, shops, restaurants and public buildings display some form of visual art on their walls. It seems that everyone has an opinion about visual art, perhaps a favourite artist, artistic genre or historical era. Where does this universal interest in art spring from? Why have certain visual forms preoccupied artists across generations? What visual qualities underlie our reactions to artworks? Such questions have traditionally been tackled from the perspective of the humanities, especially disciplines such as art history and philosophy.

Psychology is the scientific study of people, the mind and human behaviour. The creation and consumption of visual art is an ancient and universal human activity and, as such, it should also be a prime focus of research in psychology. As a discipline, psychology dates from the mid-nineteenth century, when a small group of European scientists devised new experimental methods for measuring simple human behavioural responses. Over the last 150 years, psychologists have adopted concepts and techniques from a very wide range of scientific disciplines in their quest to understand the human mind and behaviour. Advances in neuroscience have had a crucial impact on psychological theories, providing researchers with fundamental information about the structure and function of the human brain. Mathematics and computer science have supplied deep theoretical principles that help us to understand the information available in visual images and the constraints within which any physical system must operate when trying to make sense of visual information.

Therefore, modern psychology should be ideally placed to make a significant contribution to our understanding of visual art. However, research on the psychology of visual art presently does not occupy a mainstream position in science. Lack of progress in the past is partly a reflection of the fact that research on the psychology of art is undoubtedly more challenging than research on many other aspects of human cognition. As an experimental psychologist interested in visual perception, I usually design experiments with two principles constantly in mind: simplicity and control. The visual images I use as

experimental materials are kept as simple as they possibly can be, so that they isolate specific visual features for investigation. Typically they are very basic, precisely defined patterns of dots or bars, which permit inferences about the link between stimulus features and perception to be made with some degree of confidence. Presentation of the images to experimental participants is carefully controlled to minimise the intrusion of extraneous factors in their responses. In the case of research on visual art, on the other hand, the source material is inherently complex and subject to manipulation by the artist rather than the experimenter (mostly not in the interests of simplicity), so inferences are much more difficult to make. However, recent advances in methodology have opened up many new options for studying art from a scientific perspective, which I and many others are taking up with enthusiasm. Sophisticated mathematical techniques now allow us to analyse and describe the detailed physical characteristics of even the most complex artworks. Furthermore, new experimental techniques such as eye movement recording and brain imaging give researchers an unprecedented ability to access the perceptual effects of these images. Consequently, recent progress in our understanding has been rapid.

Another factor has also impeded progress in the developing science of visual art. During the twentieth century, a cultural divide grew between the arts and the sciences, partly driven by educational traditions that steered students towards one or the other but not both, especially at more advanced levels of study. I experienced this directly as a teenager when I was steered away from a childhood preoccupation with art-making towards training in science. Scientific methodology was considered by some to be an inappropriate tool for studying art (and still is in some quarters). In the centuries prior to this modern divide, there was a continuing dialogue between the two cultures. Leonardo da Vinci is now recognised as both a brilliant scientist and a renowned artist, although the term ‘scientist’ was coined only in the mid-nineteenth century, hundreds of years after his death. Artists have exploited scientific and technological advances for generations. Renaissance artists were well versed in the laws of perspective. Nineteenth-century painters such as Edgar Degas were directly influenced by photographic imagery. Exponents of Op Art in the 1960s were inspired by research in perceptual psychology.

The gap between the two cultures is beginning to close again, partly driven by scientific and technical advances that have become more sophisticated, yet, at the same time, more accessible to non-specialists. Interactive artists such as Daniel Rozin often use complex computer programs to control the interaction with the spectator. Many painters such as David Hockney have embraced the use

of digital media in their work. Creativity and originality is increasingly recognised as an essential quality of both great art and great science, closing the perceived gap between the two cultures. On the science side, the fundamental characteristics of the human sensory and perceptual systems are quite well understood now, so I and many other researchers in psychology and neuroscience have begun to apply this knowledge to the search for a deeper scientific understanding of visual art.

This book is an attempt to summarise and evaluate the recent advances that have been made and so encourage others to build on them and forge ahead to make new discoveries. It should appeal both to artists interested in science and to scientists interested in art; indeed, it is aimed at anyone who has an interest in the relationship between visual art and the brain. Little prior knowledge in either sphere is assumed, but an open-minded willingness to take on novel and sometimes controversial issues spanning the two is essential.

The book should find a place in undergraduate and graduate courses across a range of science and art disciplines including psychology, neuroscience, fine art, media and art history. Hopefully it can work well as the course text for a specialist course on the psychology of visual art. I have taught such an interdisciplinary course for a number of years and it is a pleasure to witness the enthusiasm and ingenuity with which students apply concepts and knowledge they have learnt in one domain of study to another domain, whether from science to art or vice versa.

I am grateful to several people for their critical and insightful comments on sections of the manuscript, in particular Al Rees, Stephen Herbert and Anna Franklin, as well as to the editorial team and their reviewers at Cambridge University Press. Any remaining errors are, of course, my own responsibility.