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both knowledge of the world and experience of art — is greatly underestimated in this paper (one only has to think of the cultural differences), but it is a brave attempt, and should stimulate the psychology of art as well as opening up some new neural pathways in the brains of art historians and critics.

In conclusion, this is an interesting and controversial paper, which is likely to stimulate a lively debate, both within the art history and neuroscience communities. Indeed it's hard to think of a better example of C.P. Snow's 'two cultures'. The debate surrounding this paper will be an interesting test of whether there has been any progress towards a rapprochement between these two opposing camps in the half century since the time of Snow's original complaint.

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## IT DON'T MEAN A THING IF IT AIN'T GOT THAT SWING

*Bruce Mangan, Institute of Cognitive Studies, 608 Barrows Hall, University of California, Berkeley CA 94720-3020 USA. mangan@cogsci.berkeley.edu*

In 'The Science of Art' Ramachandran and Hirstein (hereafter R&H) have written a vigorous, thought provoking paper. It raises many issues, but in the interest of brevity, I can only consider a few of them here.

Why is art — or, more broadly speaking, aesthetic experience — important for the study of consciousness? Works of art are usually perceptual objects and they usually evoke emotions. But most of our consciously experienced emotions and perceptual capacities have no unique relationship to art. What art does — when it succeeds — is to intensify or deepen the contents of emotional, perceptual and cognitive experiences that otherwise occur in many non-aesthetic contexts. R&H themselves touch on this point when they say, 'The purpose of art, surely, is not merely to depict or represent reality — for that can be accomplished very easily with a camera — but to enhance, transcend, or indeed even to *distort* reality' (p. 16, their emphasis).

For consciousness research, the central fact about art is its ability to enhance and intensify experience. To understand this aspect of our phenomenology, it is also useful to investigate the operative stimuli in the art object and the physiological processes that these stimuli activate. But if our interest is centred on consciousness, questions about stimuli and neurophysiology are just means to a phenomenological end — that of examining the peculiar experience-enhancing quality possessed by successful works of art. R&H have pointed out many possible links between art and the psychology of perception, reinforcement, neurology, the peak shift effect, grouping, problem solving, and so on. But this is really just a prologue to understanding what it is that *distinguishes* the aesthetic — and aesthetic experience — from much more inclusive psychological phenomena.

Their most developed thesis is that 'all art is caricature'. If I understand them, they hold that at the *stimulus level*, the most crucial thing about the visual arts is the relatively extreme distortions they contain; it is these distortions, via the peak shift effect,

that give rise to our feeling of aesthetic enhancement. (Perhaps the intuitive link here with aesthetic phenomenology is that distortion is a sort of analogical intensification of a normal image, as aesthetic experience is an intensification of the contents of consciousness.)

The immediate difficulty with this position is that it is generalized from a very skewed sample of artwork. We could just as well point to a painting by Vermeer or a sculpture of the Buddha from the Gandhara school, and argue that it is the remarkable realism and *lack* of distortion that gives them their aesthetic force. Many successful and deeply moving works of visual art simply don't have the distorted, caricature-like quality found in so many of R&H's examples. Distorted images can have aesthetic impact, but certainly images without distortion can have aesthetic impact too. Whatever it is that constitutes the overall quality of aesthetic intensification, distortion is not a necessary condition for it.

Here the converse deepens the problem, and brings out what I think is the most basic difficulty with which R&H still need to grapple. In general, distorting an image does *not* turn it into a successful work of art. Otherwise we would decorate the world with fun-house mirrors. It is certainly true that caricatures use distortion as their primary technical device. But I doubt Ramachandran and Hirstein want to have their theory rise or fall on the proposition that caricatures are especially strong works of art. For every Daumier and Hirshfeld, there are a thousand hack political cartoonists. All of them are able to distort people's faces well enough to keep their jobs, but in general this does not make their caricatures more successful works of art than the standard run of more realistic sketches found in, say, newspaper clothing ads.

Distortion is just one of many, many techniques in an artist's bag of tricks. Beyond this, distortion has no special standing, since great art is perfectly possible without it, and failed art (or no art at all) is perfectly possible with it.

The same problem undercuts many other attempts to nominate this or that single stimulus type as the source of aesthetic impact. Proponents of the Golden Section can certainly point to great works of art that embody this proportion, just as Freud's followers can point to overt and covert sexual content. But whatever the candidate for the single stimulus type is claimed to be, independent observers can always find many other masterpieces which do not have it.

A vast number of distinct content and stimulus categories are *sometimes* salient in art, and are often found together in various mixes in a single work. (Note the overlay of sexual content and stimuli distortions in many of R&H's own examples.) It is probably because of the complex interdependence of *many* elements that the aesthetic impact of a work is so fragile. We all know, for example, at the phenomenological level, that making the smallest change when trying to mimic or copy a work of art can destroy the aesthetic impact of the original. This is one reason to doubt Ramachandran and Hirstein's claim that because of 'constraints on allocation of attentional resources, art is most appealing if it produces heightened activity in a *single* dimension' (p. 15; my emphasis).

But the larger question about the relation of art to the limitations on consciousness is, I think, fundamental — though my inclination is to move in the opposite direction from that taken by R&H. First of all, it is very difficult to pull off an argument based on an appeal to allocation constraints once we consider *nonconscious* processing, which is all but unlimited. The standard PDP notion of massively parallel and distrib-

uted processing in the brain looks like it is remarkably well suited to handle art, if indeed successful art results from the deft handling of an extremely complex overlay of many different stimulus components.

On the other hand, consciousness certainly does labour under severe restrictions. The capacity of consciousness is far too limited to represent even a few details of nonconscious PDP-like neural interactions. Consciousness usually represents the *conclusions* of nonconscious processing, and not the processing itself. This point was emphasized long ago by Mandler (1975).

So the straightforward cognitive move is to locate the aesthetic processing of many distinct stimulus dimensions in PDP-like neural mechanisms at the nonconscious level, and expect that only the most summary representation of these processes will reach consciousness. And, in fact, aesthetic phenomenology is remarkably consistent with this possibility. Among other things, it lets us explain why we can instantly feel that a work is good, and yet spend a lifetime unable to say precisely why. This 'ineffable' quality is one of the primary features of aesthetic experience, and perhaps the chief reason why it is so puzzling and difficult to deal with. Put in functional and not phenomenological terms, the feeling of aesthetic impact works like a summary index (perhaps analogous to the PDP metric goodness-of-fit), representing in consciousness the degree of coherence of the various aesthetic components processed at the nonconscious level.[5]

When R&H go beyond a stimulus level analysis, they seem on firmer ground. Here their chief concern is to link the peak shift effect with aesthetic reinforcement. I suspect they will find a good deal of support in another empirically based theory of the aesthetic, that of the experimental psychologist D.E. Berlyne (1971), though, in my own opinion, Berlyne also needs to be significantly augmented.

Among other things, Berlyne's work shows that moderate *variations* from an expected or habituated stimulus are reinforcing, while more extreme variations are adversive. This apparently includes peak shift reinforcement if we assume that, say, the rat in R&H's initial example is already familiar (because of its earlier trials) with a 3-to-5 aspect ratio rectangle, but was not familiar with this rectangle in the initial experimental task. The subsequent introduction of a 4-to-1 aspect ratio rectangle would, on Berlyne's theory, then produce a stronger positive response than the rat would show for the first rectangle. Berlyne applied this point not only to aesthetic reinforcement, but to larger issues of reinforcement in perceptual unification, exploration, problem solving, and so on. And Berlyne carried out many 'psychophysical' experiments of the general sort R&H envision.

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[5] For an extended treatment of this view and its further implications for aesthetic phenomenology, see Mangan, 1991; for a relatively brief discussion of this view, focused on normal cognition in consciousness, see Mangan, 1993a,b.