

Mirror and canonical neurons are crucial elements in esthetic response

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Our positions are not recognizable in this account. We did not suggest that the activation of mirror or canonical neurons was sufficient for esthetic appraisal or for judgments about artworks. Our claim was that canonical and mirror neurons often have a crucial role in esthetic responses – because of their role in various forms of simulated embodiment that are relevant in considering esthetic responses, and that offer the basis for understanding the neural substrate of empathetic reactions to works of art. As the respondents remark, we claimed that embodied and empathetic responses, too long neglected, have a much wider role in esthetic responses than hitherto acknowledged.

Our choice of artworks was limited by the constraints on an opinion paper in *Trends in Cognitive Sciences*. We chose the works we did because they offer clear illustrations of the felt bodily responses of beholders to works of art; but we made equally clear that such responses can also apply in the case of lesser known – and sometimes everyday – images (indeed, neither the Fontana nor the Pollock are especially well known, and of course, neither is Gory).

If so, where do the esthetic implications of our claims lie? First, and most obviously, we claimed that no esthetic judgment is possible without a consideration of the role of mirroring mechanisms in the forms of simulated embodiment and empathetic engagement that follow upon visual observation. Second, we noted that such processes might be precognitive and not always dependent on perception informed by cognition and cultural stock (as in much traditional esthetics). Third, we suggested that artistic skill lies in the ways that artists more or less successfully make conscious and unconscious use of body knowledge to elicit the kinds of emotional and felt motoric responses we described in our paper.

We agree – and nothing in our paper suggests otherwise – that a crucial issue in esthetics is the inheritance of a drawing style from other draughtsmen (see [Box 1](#)).

Although some common ground can be found in the above remarks, in one area we differ substantially. The possibility that conceptual works of art might also activate motor responses can by no means be excluded (indeed the role of canonical neurons in activating motor responses suggests as

Box 1. Embodiment and style

The issue of the relationship between cognition and the inheritance of style has been fully dealt with by Gombrich [3], who clearly describes how this can influence the drawing acts of the observer. But claiming this does not exclude the possibility of empathetic corporeal involvement with the act of drawing itself, as we suggest in ref. [4]; this is clearly set out by Rosand [5], where full due is also given to the inheritance of artistic style. Here can be found well-worn and useful hypotheses of exactly the 'productive mid-level' kind wished for by Casati and Pignocchi. We take these hypotheses fully into consideration in our paper. We have no doubt that experience in drawing production could improve the ability to detect influences between draughtsmen, as suggested by Calvo-Merino *et al.* [6] whose work we cite in our article. Indeed, we would hope that attentiveness to just these possibilities could enhance esthetic appreciation of works of art, and possibly forms of therapeutic use of esthetics. Further hypotheses of our own will be forthcoming along exactly these lines.

much). This issue is amongst the many that we hope our article opens up for further experiments.

Are esthetic responses purely a matter of the way in which the concept of art is considered (as suggested, e.g., by Arthur Danto [1])? This view is sometimes held strongly these days; Collingwood [2] and others espoused it. The point of our article was to suggest that this view is mistaken. However much the concept of art is detached from emotional and embodied responses, and however much it is taken to be purely historical (all of which is perfectly possible), no form of esthetic appreciation, we claim, can be fully envisaged without considering mirror systems and their role in embodied and empathetic responses – and therefore of the kinds of motor simulation we outlined.

References

- 1 Danto, A. (1986) *The Philosophical Disenfranchisement of Art* Columbia University Press
- 2 Collingwood, R.G. (1955) *The Principles of Art* Clarendon Press
- 3 Gombrich, E.H. (1969) *Art and Illusion: A Study in the Psychology of Pictorial Representation* (2nd edn), Princeton University Press
- 4 Freedberg, D. and Gallese, V. (2007) Motion, emotion and empathy in esthetic experience. *Trends Cogn. Sci.* 11, 197–203
- 5 Rosand, D. (2002) *Drawing Acts, Studies in Graphic Expression and Representation* Cambridge University Press
- 6 Calvo-Merino, B. *et al.* (2006) Seeing or doing? Influence of visual and motor familiarity in action observation. *Curr. Biol.* 16, 1905–1910

Mirror and canonical neurons are not constitutive of aesthetic response

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The alleged neural basis of empathic responses to artworks is only of marginal relevance for aesthetics and for cognitive theories of art, contrary to Gallese and Freedberg [1].

The activity of the mirror neuron system (MNS) has been claimed to provide the neural underpinnings for several mental capacities, including, but not limited to, imitation, mindreading, language understanding and concept formation. According to Gallese and Freedberg [1], MNS or so-called 'canonical' neurons (or both) are crucially involved in our aesthetic appreciation as well. The claim concerns both the representational content and the vehicle of artworks. There are empathic responses to the representational content of artworks in which actions, objects and sensory interactions (e.g. human bodies being touched or wounded) are displayed; and responses to vehicles (e.g. paint on canvas, sculpted surfaces) in which the gestures of artists are readable from the traces they left (e.g. brushwork). The idea is presented as a major step forward in a landscape of aesthetic studies where the only cognitively relevant aspects of art are 'disembodied' ones, and as new support for neglected or forgotten studies in which empathic or bodily effects were taken to have a major role in aesthetic appreciation.

The proposal is, however, open to the charge of irrelevance to the issues of aesthetic experience and of what constitutes artworks. Already the choice of artworks to be discussed, such as the Michelangelo, Goya, Caravaggio and Pollock quoted in ref. [1], is open to objection: all the works are both famous, so as to suggest and emphasize the importance of this issue for art; and mostly gory, so as better to nail the empathic point. Moreover, the examples are not used specifically. In the case of empathic responses to content, witnessing the corresponding non-artistic real-life scenes, say, of a man trying to escape from a mould of clay, of genital mutilation or of a finger probing an open wound, is expected to arouse relevantly similar responses as those provoked by the artistic examples. In the case of somatic responses to the vehicle, the perception of nonartistic handwriting (itself mentioned in ref. [1]) is documented to have the requested somatic effects that are so telling in the Pollock and Fontana examples. Activation of MNS or of canonical neurons is thus not sufficient for aesthetic appraisal or judgments that something is an artwork. Nor is such activation necessary. Purely

Box 1. Style production and recognition as a viable mid-level hypothesis in the cognitive study of art

Still missing from the open field of the cognitive study of art are mid-level hypotheses that are both aesthetically specific (as opposed to general claims, e.g. about emotions) and functionally interfaced with psychological findings. Consider the notion of 'drawing style', central to art history and the philosophy of art. One crucial issue is whether the style of a draughtsman is inherited from other draughtsmen (see ref. [2] for a positive answer). Activation of the MNS might enable the observer of a drawing to retrieve some dynamic components of the gesture of the draughtsman. This in turn might influence the drawing acts of the observer (see ref. [3] for an experiment showing that the direction of the drawing movement can be recovered when perceiving a line). A productive mid-level hypothesis would be that drawing style relies on the dynamics of the hand of the draughtsman and that MNS subserves both style inheritance and recognition, by observers, of such influence between draughtsmen. This claim generates both new distinctions relevant for the philosophy of art and testable hypotheses for neuropsychology. One of them is that experience in drawing production improves the ability to detect influences between draughtsmen (see ref. [4] for related work on dancers).

conceptual artworks are unlikely to activate the requested motor responses; but artworks they are, and we can appraise them aesthetically.

Two comments:

- (i) The question that is relevant to a theory of art is whether empathic response is constitutive of aesthetic response *tout court*. This is clearly an issue to be addressed before, and independently of, establishing the possible neural underpinnings of empathic response.
- (ii) In the case of responses to the vehicle, a promising avenue is open to empathic accounts, considering the nonmarginal corpus of drawings (see Box) and calligraphy in the whole of artistic production (as opposed to the relative marginality of Pollocks and Fontanas).

References

- 1 Gallese, V. and Freedberg, D. (2007) Motion, emotion and empathy in esthetic experience. *Trends Cogn. Sci.* 11, 197–203
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