

Finding mutual interest between neuroscience and aesthetics: a brush with reality?

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Commentary on "Huang, M., Bridge, H., Kemp, M.J. and A.J. Parker (2011) Human cortical activity evoked by the assignment of authenticity when viewing works of art. *Front. Hum. Neurosci.* doi:10.3389/fnhum.2011.00134"

At the point that we first discussed the design of this study, a few items, previously diverse, were brought together. First, Mengfei Huang arrived in Oxford wanting a research project for her Masters course in the area of neuroaesthetics. This was timely as the early discussions on this topic had already rolled out to new students coming through and those students wanted to know what the excitement was all about. Second, Martin Kemp and I had already been holding a dialogue on these topics in a number of different fora, supported at times by the Oxford McDonnell Centre in Cognitive Neuroscience and most significantly by time spent at the Getty Research Centre in Los Angeles. Third, Holly Bridge had established a programme of quantitative visual neuroimaging within the umbrella support of the Oxford centre for Functional magnetic resonance imaging of the brain (fMRI).

It was however Mengfei's arrival and request that shook things up. It's important to understand why that should have happened. There is a style and strand of academic discussion that never leaves the realm of possibilities. Discussion can stay for months grammatically locked down in sentences that only employ conditional tenses or the subjunctive mood: 'would', 'could' and 'should' become attached to every verb where possible. Often, these are important discussions that level the ground, but when a student arrives and actually wants to conduct a study combining art and neuroscience, we have to construct a project.

The next important step took place in a discussion between all of us, as we attempted to find a project that could take place in a 4-month lab rotation. During a discussion about neuroaesthetics, Martin Kemp made the remark that most arts and humanities scholars are not very interested to know what neuroscientists think about aesthetics. There is after all a continuous and long-lived strand of debate and thinking about aesthetics among arts and humanities scholars and there would be more interest in a neuroscience angle if it could align itself better with those debates. Martin suggested the idea of working on authenticity, since it is not only of theoretical significance to scholarly debate but of immense consequence in the world of art dealing. Decisions about whether a work of art is authentic can make a difference of 10-fold or more in the monetary value of an item of artwork.

The world of Rembrandt scholarship had been recently shaken up at the time these discussions were taking place. Many artworks previously thought to be genuine articles changed status and became “provably not-Rembrandt” or “not provably Rembrandt”. This seemed like a great opportunity, especially as there were sufficient artworks of one specific type, being portraits, which could be gathered together as a stimulus set for the brain-scanning experiments. The other point is that many people in the available student population already know in a vague way what a Rembrandt portrait looks like, but almost none may be expected to have the expertise to keep up with the latest assignments of authenticity from The Rembrandt Database (<http://rembrandtdatabase.org>).

Thus, we chose a set of 50 portraits, half of which were assigned as genuine by the latest scholarship and half of which were considered as not genuinely by Rembrandt. We added the labels “authentic” and “not authentic” during viewing of the artworks by the participants in the brain-scanner. These labels were intended to guide the participants to regard the labelling as an expert view on the portrait that they were viewing. We arranged a lot of counter-balancing of portraits and labels, to ensure that none of the 14 participants saw the same image twice and all images, whether genuine Rembrandts or not, were equally often viewed under the assignment of “authentic” and “not authentic”. We did not seek to arrange viewing of the same image by the same observer under the two different assignments.

The outcome of the scans revealed two positive findings. First when the observers viewed images that labelled as “authentic”, there was a modest but clear activation of the orbito-frontal regions of the brain. These regions are associated generally with reward, but also specifically a winning event in a gambling game and other positive hedonic experiences. Somehow, being told that we are viewing the “real deal” is rewarding to people who are aware of artwork and its significance. Second, when viewing images labelled as “not authentic”, there is a more subtle interaction between different regions of the brain. When viewing under this label, the fronto-polar regions of the cerebral cortex (generally associated with high-level reasoning) are in tighter communication with the visual cortex. In the paper, we speculated that this might be because the label “non-authentic” results in the viewer engaging with the artwork in a specific way, puzzling over what visual features in the image might reveal the artwork as fake.

The timing and topic of the publication generated a lot of general public interest in the press and other media. In large part, this was borne along by the high level of interest in Rembrandt (Parker, 2014;Huang et al., 2017) himself, but also the element of detective work that is implied by chasing down what is authentic and what is not (Parker, 2018). But the question of authenticity in art and literature was very much in discussion and remains so. Examples are tribute novels, such as new

novels in the style of Jane Austen, and the current enthusiasm for historical fiction. In respect of visual art, not long after our article, the Dulwich picture gallery in London temporarily installed a modern copy of a picture by Fragonard into their collection and challenged visitors to identify the fake (Bee, 2015). And, of course, nowadays the whole question of authenticity is driven harder still by the prevalence of fake news and the weaponization of falsehood as political artillery.

Separately from that, there was an important negative finding from the study. We did wonder whether some aspect of the brain responses measured in the scanner would allow us to detect genuine Rembrandts, regardless of the labels that we had attached to them. Naturally, as discussions proceeded, we shared some wild speculations that we could shake up the entire art world by inserting some neuroscience technology into the process of authenticating artworks. In the end, there was no evidence that any brain signal could differentiate real from fake Rembrandts, although it must be acknowledged that our participants were not viewing the actual artworks themselves as they were actually viewing digital images on a computer display screen. Some similar ideas have been pursued using a combination of psychological judgments and computer-based learning with artificial neural nets to examine whether it is possible to create abstractions of artistic style (Gerhard and Bethge, 2014).

In the artworld and more generally, our findings alter the notion of expertise, specifically the notion of the "expert eye". Labelling of art certainly has an influence on its reception and there is every reason to think that experts will be influenced by the opinions of others. Martin Kemp was keen to probe that question of expertise more deeply, but we hesitated on that question because we felt the nature of expertise is in itself diverse. People become experts in judging artworks through a variety of routes and the nature of expertise can become highly individual. It is interesting to reflect on changes in the regard for direct testimony that has taken place in other spheres of human activity. In the criminal justice system, there is less weight applied to the evidence of eye witnesses, who are sometimes unreliable for entirely human reasons, but there is a greatly increased use of other forensic evidence, such as DNA testing. In the public at large, it is encouraging that the views of experts are still highly influential but it is also clear that this must be coupled with greater insights into how expert judgments are formed and how the expert conclusions then influence the behaviour of everyone else.

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