

Beauty is in the medial orbito-frontal cortex of the beholder, study finds

July 6 2011



Husbands bringing their ugly wives to a windmill to be transformed into beautiful ones. Engraving by P Fürst, c.1650. Credit: Wellcome Library, London.

(Medical Xpress) -- A region at the front of the brain 'lights up' when we experience beauty in a piece of art or a musical excerpt, according to new research funded by the Wellcome Trust. The study, published today in the open access journal *PLoS One*, suggests that the one characteristic that all works of art, whatever their nature, have in common is that they lead to activity in that same region of the brain, and goes some way to supporting the views of David Hume and others that beauty lies in the beholder rather than in the object.

"The question of whether there are characteristics that render objects beautiful has been debated for millennia by artists and philosophers of art but without an adequate conclusion," says Professor Semir Zeki from the Wellcome Laboratory of Neurobiology at UCL (University College London). "So too has the question of whether we have an abstract sense

of [beauty](#), that is to say one which arouses in us the same powerful [emotional experience](#) regardless of whether its source is, for example, musical or visual. It was time for neurobiology to tackle these fundamental questions."

Twenty-one volunteers from different cultures and [ethnic backgrounds](#) rated a series of paintings or excerpts of music as beautiful, indifferent or ugly. They then viewed these pictures or listened to the music whilst lying in a [functional magnetic resonance imaging](#) ([fMRI](#)) scanner, which measures activity in the brain.

Professor Zeki and colleague Dr Tomohiro Ishizu found that an area at the front of the brain known as the medial orbito-frontal cortex, part of the pleasure and reward centre of the brain, was more active in subjects when they listened to a piece of music or viewed a picture which they had previously rated as beautiful. By contrast, no particular region of the brain correlated generally with artwork previously rated 'ugly,' though the experience of visual ugliness when contrasted with the experience of beauty did correlate with activation in a number of regions.

The medial orbito-frontal cortex has previously been linked to appreciation of beauty, but this is the first time that scientists have been able to show that the same area of the brain is activated for both visual and auditory beauty in the same subjects. This implies that beauty does, indeed, exist as an abstract concept within the brain.

The medial orbito-frontal cortex was not the only region to be activated by beauty. As might be expected, the visual cortex, which responds to visual stimuli, was more active when viewing a painting than when listening to music, and vice versa for the auditory cortex.

However, particularly interesting was that activity in another region, the caudate nucleus, found near the centre of the brain, increased in

proportion to the relative visual beauty of a painting. The caudate nucleus has been reported previously to correlate with romantic love, suggesting a neural correlate for the relationship between beauty and love.

Professor Zeki adds, "Almost anything can be considered art, but we argue that only creations whose experience correlates with activity in the medial orbito-frontal cortex would fall into the classification of beautiful art.

"A painting by Francis Bacon, for example, may have great artistic merit but may not qualify as beautiful. The same can be said for some of the more 'difficult' classical composers – and whilst their compositions may be viewed as more 'artistic' than rock music, to someone who finds the latter more rewarding and beautiful, we would expect to see greater activity in the particular [brain](#) region when listening to Van Halen than when listening to Wagner."

Professor Zeki was the recipient of a £1million Wellcome Trust Strategic Award in 2007 to establish a programme of research in the new field of 'neuroaesthetics' in search of the neural and biological basis for creativity, beauty and love. The research brings together science, the arts and philosophy to answer fundamental questions about what it means to be human.

More information: Ishizu T and Zeki S. Toward a brain-based theory of beauty. PLoS One 2011 [epub ahead of print]
dx.plos.org/10.1371/journal.pone.0021852

Provided by Wellcome Trust

Citation: Beauty is in the medial orbito-frontal cortex of the beholder, study finds (2011, July 6) retrieved 20 March 2024 from <https://medicalxpress.com/news/2011-07-beauty-medial-orbito-frontal-cortex.html>

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