

Visual properties driving visual aesthetics workshop



14th January 2015

**Academic Board Room, Eleanor Rathbone Building
University of Liverpool**

Schedule

9:00 Meet and greet

9:05 Alexis Makin (Liverpool) (20)

9:25 Chris McManus (UCL) (25)

9:50 Johannes Zanker (Royal Holloway) (25)

10:15 Coffee & Roundtable discussion

10:45 Richard Taylor (Oregon) (25)

11:10 Alex Forsythe (Liverpool) (20)

11:30 Nichola Street (Liverpool) (20)

12:00 Lunch & Roundtable discussion

13:00 Marco Bertamini (Liverpool) (20)

13:20 Giulia Rampone (Liverpool) (20)

13:40 Coffee & Roundtable Discussion

14:10 Johan Wagemans (Leuven) (25)

14:35 Marcos Nadal (Vienna) (25)

14:55 Letizia Palumbo (Liverpool) (20)

15:15 Roundtable Discussion

15:45 Close of Workshop

16:00 Lab tour (optional)

18:30 Workshop Dinner

Conceptual and methodological challenges for scientific aesthetics

Alexis Makin, University of Liverpool

The prototypical aesthetic experience has been described as a state of rapture: a sense of the transcendent and sublime. It includes fascination with the object of appreciation, aesthetic chills, and perhaps total immersion in a make-believe world. Contemporary researchers studying aesthetics with the tools of cognitive science would agree that these rare and special mental states are beyond investigation for the foreseeable future. If nothing else, there is the simple problem that aesthetic rapture cannot be reliably evoked in the laboratory. Thus we resort to studying everyday emotional responses instead (Concession 1: Give up on studying special emotions). However, studying everyday emotions is not trivial. Apparent positive reactions to stimuli can have other causes. Meanwhile, different methods for measuring emotion correlate poorly, and no single measure is diagnostic. Thus we resort to measuring cold judgments. (Concession 2: Give up on studying ordinary emotions). Still, studying cold judgments is still not trivial. First, implicit and explicit measures of preference often diverge unexpectedly. Furthermore, laboratory studies require isolation and manipulation of variables. For example, people will prefer symmetrical, blue and smooth things when these dimensions are assessed independently. However, we cannot treat these results as production rules for successful art. New empirical results show that these 'aesthetic virtues' interact in complex ways. We can never predict preference for a perceptual whole by independently measuring preference for its parts. This Gestalt nightmare leads to a possible concession number 3 (Give up on studying cold evaluation). However, this means abandoning the whole research program: surely a step too far! We conclude that we have not yet reached a level where results of our experiments can be treated useful advice for expert practitioners, while many of the rare properties that make aesthetic experience an attractive topic of investigation are still a beautiful mystery.

Composition in photographs and in the paintings of Mondrian

Chris McManus, University College London

A recurrent theoretical idea across the arts is the idea of composition, that objects, be they visual, auditory or of any other form, should be properly placed in relation to each other in order to achieve the maximum aesthetic effect. For the graphic arts, composition is particularly dominated by the role of the frame, which bounds space and within which visual objects are organised. This talk will look at a series of studies of composition. The classic, mature paintings of Mondrian, with their white background, black vertical and horizontal lines, and blocks of primary colour, are a good experimental domain for studying composition, the structures being straightforward to manipulate in experiments. Photography also provides a good model for composition, the normal process of 'framing and filling' being replaced by a process of cropping of the visual world, the frame (viewfinder) being moved until objects appear well organised within the image. A characteristic of manipulating Mondrians and of cropping photographs is that in both cases judgements are made quickly, suggesting that low-level visual processing must be involved.

Using oculomotor responses to study aesthetic principles in composition of painting

J.M. Zanker & T. Holmes, Royal Holloway University

It was Gustav T. Fechner (1860), who laid the conceptual foundations of psychophysics by developing experimental methods (Choice, Production, Use) to objectively and quantitatively investigate the relationship between the mental world (psychological sensation) and the physical world (physical properties of a stimulus), and implied the crucial step to extend the scope of scientific methodology of psychophysics to asking questions about aesthetics, which he identified as being particularly challenging ('Propaedeutic of Aesthetics' 1876). In his seminal work on human eye movements, Alfred Yarbus (1967) added a new perspective to this venture by using paintings as stimuli to study the top-down influences on 'scan paths'. Here we present two different experimental approaches to demonstrate how oculomotor responses can be used to study aesthetics at a level of unconscious visual processing.

(1) An evolutionary algorithm driven by eye movements (GDEA) is used as an experimental method to objectively determine aesthetic preferences without referring to semantic categories.

(3) In an exploratory study we describe characteristic eye movements made by naive observers when looking at paintings, which point towards low level responses to composition schemes.

Human Response to Jackson Pollock's Fractals

Richard Taylor, University of Oregon

Fractals have been spectacularly successful in quantifying the visual complexity exhibited by many natural patterns, and have captured the imagination of scientists and artists alike. My research has shown that the poured patterns of the American abstract painter Jackson Pollock are also fractal. This discovery raises an intriguing possibility - are the visual characteristics of fractals responsible for the long-term appeal of Pollock's work? In this talk, I will present a review of people's positive responses to Pollock's fractals, including visual preference, eye tracking, skin conductance, and EEG responses.

"I'm still here"; the fractal signatures of artists with neurodegeneration

Forsythe, A., Reilly, R & Willams, T, University of Liverpool

Fractal analysis has been used to determine the authenticity of major works of art. Taylor et al. (1999) found that through a fractal analysis of Jackson Pollock's paintings it was possible to distinguish authentic works from a large collection of fakes, demonstrating that when artists paint they instil within their work their own pattern of unique fractal behaviour. Can age-indexed variations in the fractal dimension of the works of artists anticipate specific cognitive deteriorations? To answer this question we analysed age-related variations in the fractal dimension of a large corpus of digital images of work created by six artists who experienced both normal ageing and neurodegenerative disorders (n=1595). The results of our analysis showed that patterns of change in the fractal dimension of the paintings differentiated artists who suffered neurological deterioration from those of normal aging controls.

Understanding our aesthetic relationship to the natural world: What can fractals tell us?

Nikki Street, University of Liverpool

Fractal patterns are found in many natural scenes, in the clouds, landscapes and trees around us. These beautiful, 'chaotic' shapes are relatively unexplored area, meaning a true understanding of our aesthetic relationship with this new way of quantifying the complexity of nature, has yet to be explored to its full extent. The first study will explore preferences for fractal patterns across culture and environmental features. Participants were recruited from the UK and Egypt, from both urban and rural populations. Results reveal an interesting relationship between environment and fractal preference; participants from rural environments are more than twice as likely to prefer a higher complexity image from a pair of fractal images than those classifying themselves as from urban environments. This suggests that people who classify themselves as living in urban environments do not have the same aesthetic relationship with natural fractal shapes as those classifying their environment as rural. In the next phases of the research we aim to discover if these differences in aesthetic response to natural patterns are related to attitude and behaviour towards nature. The study explores the impact that preference for complexity in nature has on our attitudes to nature. My talk attempts to explore and discuss the next questions I wish to explore- if we have different aesthetic relationships with fractal shapes dependent on our visual experiences, how does this impact our behaviours and attitudes towards nature as a whole?

Marco Bertamini, University of Liverpool

Symmetry has often been linked with aesthetics. For instance Ramachandran and Hirstein (1999) lists it as one of the basic principles. One possibility is that a positive response to symmetry is universal. This fact may be linked to optimal stimulation of the visual system (Zeki, 1999, Redies, 2008). This view, however, can be criticized as too rigid (McManus, 2005).

Recently much more has become clear about brain processing of symmetry. I will briefly summarise fMRI and EEG evidence, pointing to an extended network of areas (from extrastriate areas to LOC) that respond automatically to presence of symmetry in the image. By automatically here we mean independently of the task performed by the observer, although attention does play a role in terms of extracting symmetry from perspective views (i.e., symmetry present in the object rather than in the image). It is also interesting that bilateral symmetry, the most salient and the one leading to the strongest activation, differ from other symmetries quantitatively and not qualitatively (in terms of both localization and time course). This first part of the talk covers the material in our recent review paper in the journal *Symmetry* (Bertamini & Makin, 2014).

In addition to brain responses to symmetry, I will discuss different measures of symmetry perception, in particular I will look at how closely psychophysics and explicit aesthetic evaluation are matched, and how explicit and implicit measures of preference compare. Implicit measures rely on congruency effects. In particular the implicit association test (IAT) can measure strength of associations between concepts (e.g., Bertamini, Makin & Rampone, 2013). Affective priming measures effects of congruent valence when one stimulus (symmetry) is presented incidentally (Bertamini, Makin, & Pecchinenda, 2013). The electromyogram (EMG) measures activity in the smiling muscles in response to a visual presentation of a stimulus (Makin et al., 2012). Overall we found no evidence that positive affect is automatic. However, there is good evidence that symmetry is automatically associated (probably at a cognitive level) with other positive dimensions.

References:

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Eccentricity may not affect symmetry discrimination, but affects symmetry appreciation

Giulia Rampone, Noreen O'Sullivan, Marco Bertamini, University of Liverpool

Because of its saliency, symmetry is believed to act as a cue to perceptual phenomena. Preference for symmetry might be a by-product of the ease of its processing. However, several studies have shown that increasing eccentricity impairs symmetry perception. Symmetry may thus be special to the visual system only when foveated. This study aimed to answer the question: may also preference for symmetry be linearly correlated with increasing eccentricity? A big grey circle was presented over black background. At the beginning of each trial, participants decided arbitrarily a fixation point within the circle. An abstract pattern, either symmetrical or random, flashed for 200ms on a random location within the circle. Therefore, the distance between fovea and center of the pattern was not set a priori. Participants discriminated pattern's regularity as fast and accurate as possible. Multilevel linear modeling was performed on reaction times and preference ratings. Both eccentricity and pattern regularity were unrelated to variability in reaction times. Eccentricity was not a predictor of preference formation overall. However, eccentricity had negative effect on preference formation for symmetry but not for random. We considered the possibility that preference modulation was due to misclassification of symmetry with increasing eccentricity. A second experiment was performed in which a group of participants saw only symmetry and another group saw only random patterns. Eccentricity did not predict worse performance in both cases. However, eccentricity had negative effect on preference formation for symmetry but not for random patterns. This study suggests an important role of eccentricity in the appreciation of symmetry. Unexpectedly, a detrimental effect of eccentricity on responses speed was not found. This may origin from the reduced artificiality of the experiment, as participants were allowed to autonomously choose where to look. Further studies are now investigating the contribution of this factor.

On the balance between order and complexity in aesthetics

Johan Wagemans, University of Leuven

Even in the early days, before Fechner started experimental psychoaesthetics, ideas about beauty emphasized perfection (e.g., right proportions, harmonious arrangement of parts) but also contained elements of imperfection. For Leibniz, for instance, perfection was harmony or unity within variety. In the 20th century, a lot of experimental work was aimed at testing specific quantitative expressions of this notion of balance between order and complexity, with Birkhoff (1932) proposing a divisive relationship ($O : C$) and Eysenck (1942) proposing a multiplicative relationship ($O \times C$). In this talk, I will not try to settle on one expression or the other. Instead, I will sketch its broad appeal and usefulness in capturing key factors determining aesthetic appeal and preferences. These factors will be related to characteristics of visual processing (e.g., symmetry perception, pattern perception, shape perception) and beyond. Specifically, I will try to embed the empirical work on visual pleasure in the framework of predictive coding and its fundamental principles of the brain as a complex system that is continuously generating and testing predictions. In order to explain this view, I will rely on some examples of experimental results in psychoaesthetics as well as more subjective analyses of real art works.

The effects of valence and information on judgments of visual complexity, beauty, and understanding

Marcos Nadal, University of Vienna

Research has consistently shown that visual complexity plays an important role in the appreciation of art. There are, however, reasons to believe that other factors mediate this relation, particularly valence and knowledge. This study aimed to determine (1) how valence and information about artworks influence participants' judgment of their complexity; (2) how valence and information modulate complexity's influence on liking for art; and (3) how valence and information modulate complexity's influence on understanding of art. Participants were divided into two groups, and asked to rate 60 paintings, equally divided into three valence categories (negative, neutral, positive). Participants in one group performed the task with no information, and participants in the other group received short information fragments about each of the artworks before rating them. All participants were asked to rate them on 3 scales: complexity, liking, and understanding. Our results showed that participants tended to overestimate the complexity of negative stimuli, and to underestimate the complexity of positive ones, while information increased the general accuracy of participants' complexity ratings. On the other hand, liking ratings were highest for positive images, and lowest for negative ones. However, regardless of valence, liking increased linearly with complexity. Finally, valence also affected understanding. Participants felt they understood positive artworks better than neutral and negative ones. Complexity had no influence on understanding of neutral and negative stimuli, but it did in the case of positive stimuli. For stimuli in the latter category, when participants received no information, understanding decreased with increasing complexity, but when they received information, understanding increased with complexity. Overall, thus, this study shows that visual complexity influences liking and understanding of art, but that this relation is modulated by valence and knowledge.

Explicit and implicit preference for curvature

Letizia Palumbo & Marco Bertamini, University of Liverpool

Humans prefer curved objects. Such a preference might be a byproduct of a dislike for angles as the latter signal a threat (Bar & Neta, 2006; 2007). On the other hand many artists described curves as beautiful ("the line of beauty and grace"). In four experiments we tested whether people prefer curvature rather than dislike angularity by using explicit and implicit measures.

In Experiment 1 we employed novel abstract shapes differing for their contour (angular vs. curved), but matched in all other aspects. Participants (N = 20) performed two explicit tasks by judging preference (from 0 = dislike to 100 = like) and complexity (from 0 = simple to 100 = complex) for each shape. A preference for curved contours over angular ones was confirmed. The angular shapes were rated as more complex than the curved ones, however there was no simple direct link between level of complexity and preference.

Experiment 2 addressed the fundamental question of whether explicit preference for curves also occurs when they do not form a closed contour of a shape. Participants (N=14) rated preference for novel abstract patterns made of different sets of colored lines (angular vs. curved vs. straight) seen through a circular or square aperture. We found that curved lines were liked more than either angular or straight lines (with no angles).

In Experiment 3 we used the Implicit Association Test (IAT; Nosek, Greenwald and Banaji, 2007) to assess how strong is the implicit association of curves and angular shapes (same as Experiment 1) to three categories: valance (positive vs. negative), danger (safe vs. threat) and gender (female vs. male). We found that participants (N=24) were faster in associating curved shapes to positive, safe and female words as compared to negative, threat and male words.

Finally, in Experiment 4 (N=36) we employed the manikin task (De Houwer, Crombez, Baeyens, & Hermans, 2001) as an implicit measure of avoidance and approach reactions to angular and curved shapes respectively. In this task a small figure of a person is moved towards or away from the stimulus. In half of the trials we used the same stimuli as in Experiment 1 and 3, in the other half the contour was modulated as to obtain even more or less angularity. This allowed testing the threat hypothesis: the reaction times (RTs) for moving the manikin away from angular shapes should be faster than those for moving it closer to curved shapes. Our results did not support this prediction: RTs for approaching vs. avoiding angular shapes did not differ; by contrast we found an approach reaction to curvature.

Taken together our experiments showed that explicit as well as implicit preferences for curvature do not necessarily originate from a dislike for angularity. Our empirical data support artists' view that curvature is per se visually pleasant. Further investigations should clarify the nature of such a preference.