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SHORT REPORT

Art and architecture as experience: an alternative approach to bridging art history and the neurosciences

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Abstract In 1972, Michael Baxandal characterizes the processes responsible for the cultural relativism of art experience as highly complex and unknown in their physiological detail. While art history still shows considerable interest in the brain sciences forty years later, most cross-disciplinary studies today are referring to the neurosciences in an attempt to seek scientific legitimization of variations of a generalized and largely deterministic model of perception, reducing interaction between a work of art and its observers to a set of biological automatisms. I will challenge such an approach and take up art theory's interest in the historico-cultural and situational dimensions of art experience. Looking at two examples of large-scale installation and sculptural post-war American art, I will explore instable perceptions of depth and changing experiences of space that indicate complex interactions between perceptual and higher cognitive processes. The argument will draw on recent theories describing neuronal processes underlying multistable phenomena, eye movement, visual attention and decision-making. As I will show a large number of neuroscientific studies provide theoretical models that help us analyse not the anthropological constants but the influence of cultural, individual and situational variables on aesthetic experience.

Keywords Aesthetic experience · Perceptual behaviour · Top-down attention · Land art · Installation art

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Introduction: Double Negative and Space Division Constructions

Double Negative, constructed by artist Michael Heizer in 1969–1970 with bulldozers and dynamite, consists of a pair of linear trenches at the edge of the plateau of Mormon Mesa in Nevada, both approximately 9 m wide and 15 m deep (Fig. 1). The two cuts line up across a large irregular gap formed by the natural shape of the mesa edge. Visiting this 'negative sculpture' in March 2012 as one of our last stops on a study trip with colleagues and students that took us through Utah and Nevada, the structure felt less 'abstract' than it appeared on aerial photographs and less 'gigantic' and 'vast' as conveyed by descriptions and satellite images (Fig. 2). Nobody seemed 'overwhelmed' or 'knocked out' (Strelow 1970; Causey 1998) by its size, and the 'sublime' was not a notion corresponding to our experience. The excavated space appeared modest in comparison with the enormous *Kennecott Copper Mine* visited before. Not the 'nature' in view or prehistoric monuments seemed the relevant reference points but passages cut for the historic transcontinental railroad and for the highway. Robert Smithson's (1973) metaphoric use of the term of 'entropy', relating geological to political and economical processes shaped the experience of the eroded earth and rocks. Michael Heizer himself claims that his work has to be experienced directly that it is not 'conceptual' and without historical association (Heizer cit. in: Lippard 1983; Brown1984; Felix 1979). Nevertheless, our visit to *Double Negative* is exemplary for the complex interactions between built form (or sensory input), bodily exploration, spatial perception and a number of historico-cultural, individual and situational variables such as memories of images showing the work and individual knowledge of art history and theory (compare Danto 1964).

Fig. 1 Michael Heizer, Double Negative, 1969–1970, Photo: Nina Zschocke, 2012

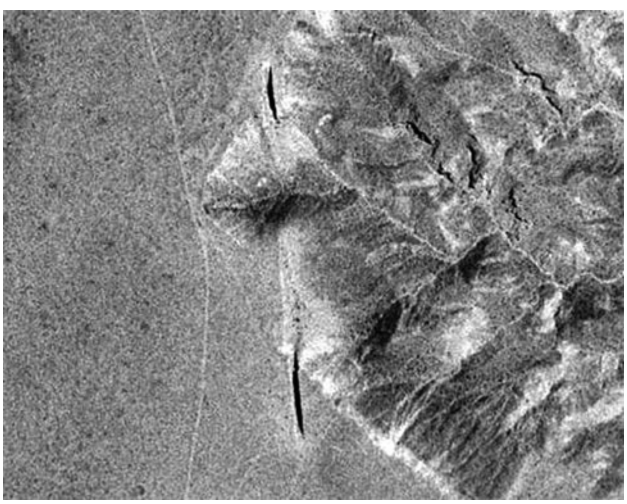

Fig. 2 Michael Heizer, Double Negative, 1969–1970, satellite image

Closer to a controlled experimental set-up, James Turrell's *Space Division Constructions* (1976—present) confront us with instable visual and bodily experiences of space that indicate a direct influence of newly gained information on perception. Uninformed observers typically see a light projection on a wall where in fact is a window to another space filled with diffuse monochrome light (Fig. 3). Once they learn about the actual spatial situation—be it via verbal information or a visual discovery made from a different viewpoint—or develop a suspicion, the experience alternates between two- and a vague three-dimensionality, pointing to an impact of the gained knowledge. The subtle perceptual shifts seem to be a product of an intention and 'effort' to perceive the hidden room.

I will examine such interactions between higher cognition and perception characteristic for art and architecture experience. Focusing on the question whether and to what extent intentions and cognitive activities such as thoughts, doubts, suspicions and assumptions might influence perceptual experience and might be able to, if only to a certain extent, 'turn the switch' between two or more alternative visual interpretations, I will ask what the neurosciences may contribute to our understanding, analysis and discussion of the processes involved.

Art history and neuroscience

Michael Baxandal notes that the processes responsible for a cultural relativism of art perception 'do not work serially' and are 'indescribably complex and still obscure in [their] physiological detail' (1972:32). Forty years later, studies linking art history and neuroscience are less devoted to understanding such nonlinearities than to mapping aesthetic qualities to the brain regions involved (e.g. Kawabata

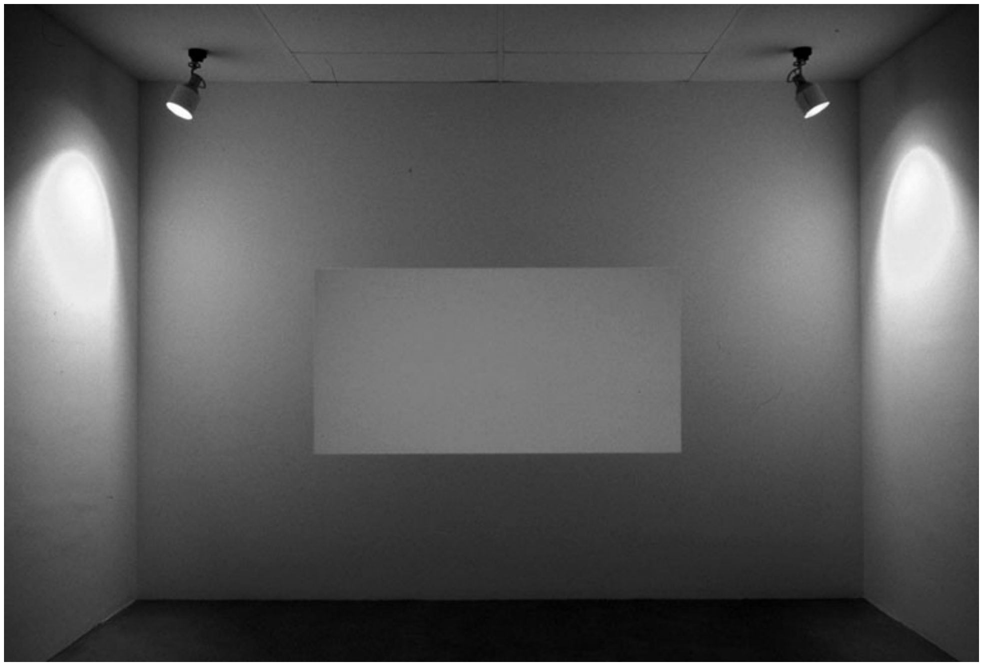

Fig. 3 James Turrell, Moab, 2001, division space construction, Photo: Florian Holzherr

and Zeki 2004; Tomohiro and Zeki 2011[1]) or are introducing an environmental determinism to a history of creative expression and aesthetic experience (Onians 2010, 2007). Others examine 'imitative bodily feels' that mirror abstract compositions and figural scenes seen in images. Such imitative feels are said to occur also 'in response to experience of architectural forms, such as a twisted romanesque column' (Freedberg and Gallese 2007, p.197). While this adds interesting observations to a discourse on possible interrelations between visual, bodily and emotional responses to art, the authors assume an immediate and automatic relation between form (or visual stimulus) and experience. I will not question that 'imitative' bodily responses to visual stimuli are possible and frequently experienced but challenge the determinism of the theory presented as an explanation.

An alternative approach: behaviour, eye movement and attention

If we take up art theory's engagement with the historico-cultural and situational dimensions of art and architecture experience and search the brain sciences for useful models, neuroscientific studies on eye movement and visual attention that describe 'top-down' influences of higher cognitive processes on perception are of particular interest. While 'attention' stands for a selective enhancement of scene aspects, eye movements such as 'saccadic eye movements' (used to rapidly look back and forth when examining a picture or scene) decide which 'stimuli' reach the fovea. Traditionally, movements have been divided into stimulus-driven (predictable) 'reflexes' and goal-driven (unpredictable) voluntary 'behaviour'. The concept of reflex describes animals as 'geared' into the turning universe that drives them (Sherrington 1906). Reflex-like eye movements were defined as fully determined by the physical properties of the visual input—that is, by neuronal maps representing the 'bottom-up' salience of the stimuli. However, it has been argued that 'reflexes are a framework for thinking about the connection between sensation and action that is outdated and mechanically inadequate' as 'at a physiological level there is no such thing as a reflex' (Glimcher 2003a:xix). Consequently, even simple and not consciously controlled behaviour such as saccadic decision-making is thought to be best described by models that start off by defining a behavioural *goal* and that assume a neuronal process that calculates the probability of positive or negative consequences of a future behaviour (Glimcher 2003a, b; Platt and Glimcher 1999).

For perceptual attention, a distinction between stimulus-driven 'bottom-up' and goal-directed 'top-down' attention seems still valid—even though some authors suggest an equivalence of mechanisms for saccadic programming and (covert) spatial attention (Moore 2006). Over all, attentional selection is thought to result from dynamic interactions between multiple brain areas encoding both sensory

[1] Interestingly the authors assume a close relationship between the concepts of 'beauty' and 'reward'.

salience and goal information. It has been pointed out that while bottom-up salience alone would make an observer 'the slave of the stimulus', top-down, user-driven control allows us 'to modify [our] impression of an image without changing the stimulus itself' (Wolfe 2006:984). Directing perceptual attention away from an element or feature is an effective means of decreasing responses to and awareness of it—even in the case of highly salient pop-out stimuli (Ipata et al. 2006). Furthermore, attention mechanisms can lead to selective processing of task-relevant individual features (e.g. 'red') and feature dimensions (e.g. 'colour') of an object and to the suppression of the irrelevant features of the same object. To process and perceive objects as wholes is therefore 'perhaps highly natural, but not mandatory' (Fanini et al. 2006:586). On the other hand, some argue that spatial attention facilitates object recognition and that it is—under certain circumstances—needed to bind features and elements to one coherent object representation and to identify a visual object (VanRullen 2005). Results of studies using degraded, impoverished or hidden images of objects as stimuli indicate that a verbal 'cue' that informs about the expected object category facilitates and speeds up object detection and recognition (Eger et al. 2007). Other publications describe the effects and mechanisms of top-down auditory, tactile and intermodal attention. Again, it is argued that short- and long-term goals have a strong impact onto the selection of a relevant sensory stream (Burton et al. 1999; Salmi et al. 2009; Kanayama et al. 2012) and that top-down attention facilitates integration (Talsma et al. 2010). Emotion signals provide yet another source of biases on perceptual processing ('emotional attention') thought to involve a balance between bottom-up and top-down processes (Pourtois et al. 2012).

In most experiments, behavioural 'goals' are defined and controlled by '*tasks*' and verbal or pictorial '*cues*'. Accordingly, we may analyse previous experiences, contextual information, knowledge and implicit instructions by artists, curators or authors as potential 'cues' and 'tasks', having an impact on the perceptual experience of a work of art or architecture. We are required to ask how specific arguments (including one's own) redefine or influence the 'goals' an observer is pursuing in his perceptual behaviour when confronted with a work of art or architecture. It could be argued, for example, that verbal information about a hidden space in Turrell's *Space Division Constructions* enhances the awareness of minimal spatial indicators (or of a lack of surface structure) and thereby destabilizes a previous visual interpretation. The instability of perceived depth and materiality would then reflect not (only) formal qualities of the installation but changing hypotheses and motivations. Likewise, the cited neuroscientific arguments require us to ask which higher cognitive processes are triggered by Heizer's *Double Negative* itself, by a previously visited site, a discussion with colleagues, by a remembered text or photograph—and what could be the effect of their feedback into perceptual processing and, ultimately, for a visual and bodily experience of scale. Returning to photographs of *Double Negative* with Freedberg and Gallese's theory of 'imitative bodily feels' in mind, I am in fact able to experience embodied empathy with the damaged mountain surface. However, I'd argue that such imitative bodily responses are not automatic but dependent on factors such as my willingness to re-enact the authors' experiences. They involve processes of overlooking (directing attention away from) visual indicators of the picture's materiality that interferes with an immersive experience of depicted action or space. Models of top-down control of haptic and cross-modal attention may furthermore serve to describe an enhancement of specific bodily experiences.

Conclusion

Today's neuroscience provides us with theories that indeed describe neuronal processes that are 'highly complex' as Michael Baxandall suspected. The cited arguments may serve us as new theoretic precision tools. Instead of assuming reflex-like responses to sensory input and reducing aesthetic experience to simple mechanisms, they give weight to the individual and situational modulation of environmental and historico-cultural factors neglected by recent cross-disciplinary studies and only insufficiently conceptualized by earlier ones (e.g. Arnheim 1954; Gombrich 1960).

The insistence on the individual's capacity to oppose seemingly automatic effects of environmental factors that act upon him or her gives my argument a political twist. Potential behavioral 'goals' are not limited to receiving the largest amount of immediate primary 'reward' available but include 'all other factors that motivate performance, such as preference for a novel location or stimulus, the satisfaction of performing well or the desire to complete a day's work' (Maunsell 2004). We might add to the list such motivations as resistance, emancipation from tasks assigned by an authority (a scientist, artist, curator or critic) or an interest in finding proof for or against a certain claim. While 'propaganda' tries to 'hard wire' desired responses, a number of artists are interested in exposing, undermining and deconstructing the quasi-automatic processes involved. It is important to note that the 'lessons' learned in our individual past as well as social exchange is thought by a number of neuroscientists to possess the power to liberate the individual from reflex-like reactions.

Finally, I'd like to emphasize that the act of refering to individual theories offered by a different discipline—and by one as dynamic and full of controversies as the neurosciences in particular—is highly selective. Presenting primarily arguments in favour of top-down control of perceptual experience has to be tagged as an expression of my interests and convictions. It is an act of taking up a position not only within my own discipline, art history, but also in relation to debates in neuroscience.

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