

THE IMPLICATIONS OF EMBODIMENT

Cognition and
Communication

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Embodiment and the Arts

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Introduction

Why should we study embodiment in connection with the arts? At first sight, art has little in common with 'bodies': A work of art is associated with the pure beauty intrinsic to the artifact, and hence with the aesthetic involvement of the viewer; we may expect a viewer's thoughtful responses instigated by the artwork. Art is also involved with the cultural context and the historical tradition in which an artwork is situated. The literature on art theory and on aesthetics shows that art is a major topic in philosophy, not biological science. Seen from a still different angle, one may consider the sociological influences on art, the tidal waves of fashion and avantgarde; or the dynamics of art marketing, of hype and gossip. One may finally consider the politics of art, how nations and even governments are represented by certain artists or art movements; or how works of art can provide potent oppositional statements. It is therefore not at all obvious why art should have to do with the body.

When we approach art and aesthetics from a psychological perspective, however, there are several entry points by which the body permeates the aesthetic perception of art. The first is through cognition: aesthetics is perceived and appraised through the viewer's cognitive system. Cognition however is only understood appropriately as *embodied* cognition: this is the convergent result of different fields of research in psychology and cognitive science (Storch et al., 2010). Thus, probably no 'pure' cognitive processes exist. Even mathematics, since it has been invented and applied by real people, relies on metaphors and constructs that have their origins in embodied experience (Lakoff & Núñez, 2000). The same is true for aesthetic perception.

The second point is emotion: it is not feasible to disentangle aesthetic judgments from emotional and motivational responses. This is apparent in the analysis of self-reports of viewers in the art gallery. Factor analyses show that viewers in general combine aesthetic assessments ("this artwork is beautiful") with emotional evaluations ("this artwork is likable, joyful, interesting"). An important component of emotion is physiological

response. Therefore, via its link with emotion, aesthetic perception is necessarily embedded in the physiology, i.e. the body, of the perceiver.

The third reason for art perception being embodied is that viewers of art are not passive receptors of artistic stimuli. Be it in the museum or in the theatre, the audience is using and moving their bodies continuously. Recipients may often be unaware of this, yet they respond with facial expression, body posture and gestures to the contents on display. Thus, through expressive movements the body is again a part of the sensorimotor loop of art reception. The underlying processes here are emotional contagion and synchronization (Ramseyer & Tschacher, 2011) with protagonists on the screen or stage and with the contents displayed in a picture.

Finally, art must be viewed in an architectural and curatorial context. Thus, we should also consider visitor behavior and locomotion that is displayed in the space of an exhibition. Curators of exhibitions, for instance, are very deliberate and careful in their decisions on where to hang which artwork, or on the design of the interior of gallery space. The art must be put in the context of other artworks and of the physical environment. Many curatorial decisions are reflected in the overt 'mass behavior' of visitors. Ecological psychology has focused on such 'standing patterns of behavior' (Barker, 1978) that are afforded by the environment. These patterns can be seen clearly when the locomotions of visitors through a constant museum environment are visualized.

We will now introduce a project in which several of these points of embodied art perception have been monitored and analyzed.

The project 'eMotion'

In a large empirical project, eMotion¹, which was funded by the Swiss National Foundation, a wireless tracking system was installed to monitor visitors in an art museum. We obtained permission by the Kunstmuseum St. Gallen (Switzerland) to convert the museum into a large laboratory for several months in the year 2009. The exhibition "11 : 1 (+3) = Eleven Collections for a Museum" was curated particularly for this study. It consisted of 76 pieces of modern and contemporary paintings, drawings and sculptures. The show started with works of Claude Monet, Max Liebermann and Edvard Munch (Space 2); continuing to Swiss art of the early 20th century by Ferdinand Hodler und Giovanni Giacometti (Space 3) and works from classical modernity by Max Ernst, Fernand Léger, Le Corbusier (Space 4). Spaces 5 and 6 will be described in a later section. Space 7 contained works by pop-artists such as Andy Warhol and Roy Lichtenstein, and Space 8 conceptual works by Imi Knoebel and On

¹ for information see the eMotion website: www.mapping-museum-experience.com

Kawara. Finally, the exhibition presented the intervention “A Label Level, 2009” by Nedko Solakov, specially created for this show. This work consisted of 32 small graffiti-like tags (‘labels’) written on the walls of the exhibition hall in more or less visible places.

At the exhibition entrance, visitors participating in the project (N=517) received an electronic glove that included measurement sensors and a sender, which transmitted data to wireless receivers in all Spaces. This equipment allowed the precise imaging of the path of each individual through the museum. From these position data we could infer movement speed and time spent in front of a picture or object (Fig. 1). In addition, two physiological parameters, heart rate and skin conductance level, with their respective variabilities, were monitored and transmitted on a second-by-second basis. Measurements were obtained continuously throughout each participant’s visit of the exhibition. Duration of visits was optional, so that the viewers were completely unrestricted in their choice of artworks to be viewed.



Fig. 1: Participant with electronic glove in front of Günther Uecker “Antibild, Räumliche Struktur, Aggressive Reihung, 1974”

One may note here that the design of this project was especially adapted to investigate the embodiment of art perception. Whereas in typical psychological research on aesthetics, the art is usually presented as reproductions on a monitor in a psychology lab, the eMotion project set out to study art perception of real artworks in the real environment, giving participants maximal freedom of choice over the stimuli they attended. Art theorists have proposed that artworks possess a characteristic 'aura' (Benjamin, 1939/1980), i.e. they have effects that rest on the authenticity of the original. Therefore, research based on reproductions has dubious external validity: It may explore perceptual processes but miss the essentials of art perception.

The large corpus of position-imaging and physiological data was complemented by self-report assessments. We acquired demographic information together with art-related attitudes and knowledge in an entrance survey prior to the visit. At the termination of the visit, a structured interview was used to describe in detail the aesthetic-emotional judgments of participants with respect to the selected works they saw in the exhibition.

Mass locomotion behavior

Fig. 2 depicts the paths of 30 randomly chosen visitors at the entrance of the exhibition. Markers (in the original imaging procedure, orange and yellow clouds) are attached to the paths; they stand for physiological arousal (x, skin conductance; o, heart rate). Space 1, the museum's entrance hall, was equipped with two tables where visitors received the electronic gloves. The tables are visible as knots of paths (paths are represented by gray lines) from where visitors then walked across the hall, generally directly into Space 2, the first exhibition hall. When entering Space 2, Fig. 2 shows that visitors' physiology was apparently influenced by the exhibited artworks. Face validity indicates that locomotion patterns as well as the physiological shifts were related to the art on display. The physiological markers appeared to be not confounded by physical movement per se. Inside the exhibition hall, visitors' paths were complex, with a high concentration of markers in front of the artworks (the gloves were worn on right hands, leading to a slight translation of the markers and paths to the right). Interestingly, the attraction of the Corinth painting that was hung just outside the official entrance to the exhibition was minimal. This shows the environmental impact of curatorial staging on aesthetic perception; in the case of the Corinth painting we observe how the gallery environment, at least partially, 'makes' the aesthetic object. If not staged appropriately, a painting may almost disappear and not evolve its aura.

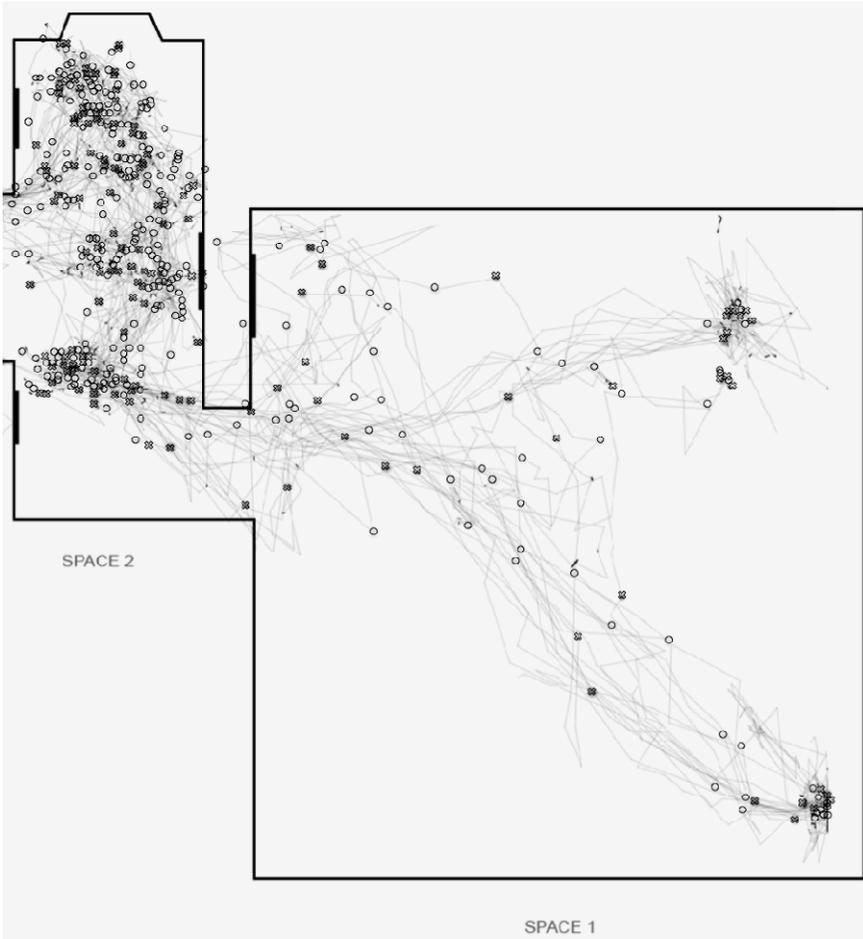


Fig. 2: Depiction of paths (gray lines) of 30 visitors in the entrance hall (Space 1) and first hall (Space 2) of the exhibition. Markers, attached to the paths, represent phasic shifts of skin conductance (x) and heart rate (o). Black solid lines depict walls, bars on the walls represent pictures. From right to left and bottom to top: works by Lovis Corinth, Claude Monet, Edvard Munch and Max Liebermann. Space 1 is approx. 10.5m X 11m

We may regard Fig. 2 as a visualization of Barker's (1978) standing patterns of behavior, a concept of ecological psychology. In the language of dynamical systems theory, the artworks appear to function as spatial attractors whose basins can be outlined using the visitors' trajectories in their vicinities. In analogy to dynamical systems, where trajectories approach the attractor, thereby compressing phase space, visitors' paths can be 'pulled into' the basins of these attractors, where the aura of the

artwork is fully experienced. For each artwork, the museum director, the curator, and the principal investigator defined this space as the artwork's Region of Interest (RoI, see Fig. 3). In the eMotion project we measured the number of visits, the duration of visits, and the physiological states inside the RoIs. The ensuing dataset contains nomothetic information on longstanding hypotheses in the field of aesthetics. For instance, we modeled the association between physiological responses inside a RoI and the aesthetic assessments of the respective artwork (Tschacher et al., in preparation).



Fig. 3: Regions of Interest (RoI) of the artworks in two halls of the exhibition, Spaces 5 and 6 (approx. 8m X 14m). RoIs are shaded areas. Solid lines, walls; thin bars on walls, artworks; two squares with shaded areas, sculptures; two gray rectangles, benches; text posters, 'L'; four small circles, columns.

Individual locomotion

In the following, we will proceed idiographically and discuss the paths of three individual visitors. We will compare their locomotion styles and physiological reactions in Space 5 and 6. The works displayed in Space 5 were by László Moholy-Nagy, Hans Arp, Paul Klee, Julius Bissier, Cy Twombly, Hans Hartung, Lucio Fontana and Yves Klein. In Space 6 visitors viewed conceptual art by Günther Uecker, Max Bill and others.

In Fig. 3, museum visitors enter from the right side. As in Fig. 2, the pictures on the walls are depicted as fat bars. The two sculptures of Space 5 are squares (the larger one is a work by Hans Arp, the small one a work by Yves Klein). The eleven small bars in a lighter shade represent

the labels of the art intervention of Nedko Solakov, placed on the walls and three columns of the Spaces. Detailed text posters are represented by 'L's. Two seating benches are indicated by gray rectangles.

The visitor's path in Fig. 4 is visualized as a black/gray line, with markers at those locations where phasic physiological responses and fluctuations occurred. 'x' indicates shifts of skin conductance; 'o', shifts of heart rate. The path is displayed in a lighter shade of gray where the visitor moved faster.

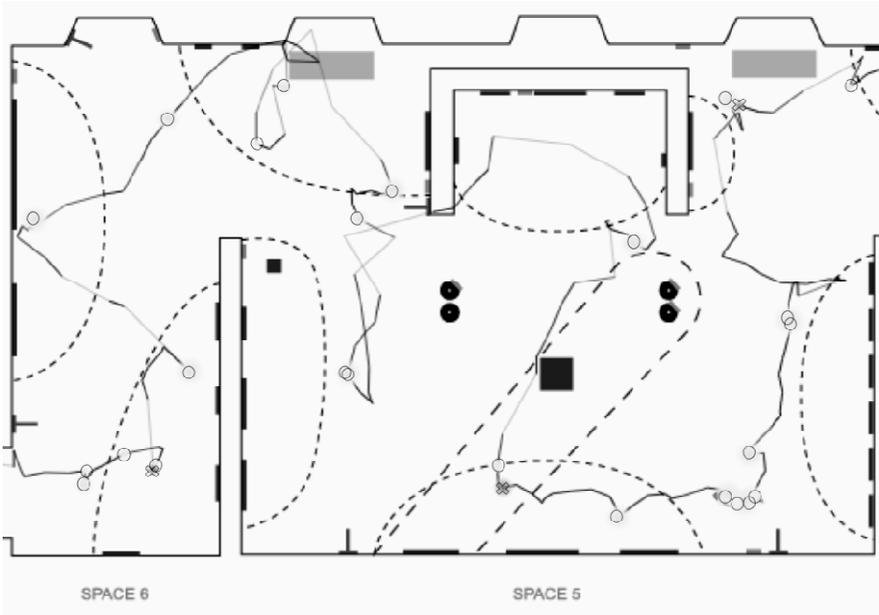


Fig. 4: Visitor SJ8 on her way through two halls of the museum. Symbols as in Fig. 3. Dotted lines indicate curatorial ensembles of connected artworks.

The path in Fig. 4 is from visitor SJ8, a woman of about 70 years. We see her entering Space 5 on the right side, passing slightly disinterestedly through these two exhibition halls (direction of locomotion is not visualized in the figures, but the raw data are in movie format). She does not view each single artwork, and keeps a rather large distance from the works. Very few shifts of skin conductance and some shifts of heart rate were measured. Significant shifts of heart rate can be found in front of two text posters (represented by 'L's) in Space 5. None of the works makes this visitor stop walking, and take a closer look, no marked physiological reactions are recorded. From this visitor's behavioral pattern one can infer that she is likely not engaged in viewing the artworks. Her art affinity index, a composite score derived from the entrance survey, combining a participant's knowledge of art, her motivation for visiting the museum and attitudes towards art, was very

low.

The imaging in Fig. 5 comes from a female visitor (SJ24) in the age group of 18-29 years. According to the entrance survey she has little art affinity (on a scale of none, little, medium, high). Compared to visitor SJ8, she is moving slower, there are few sections of gray lines in her path. She again keeps large distances to most works and crosses Space 5 fast.

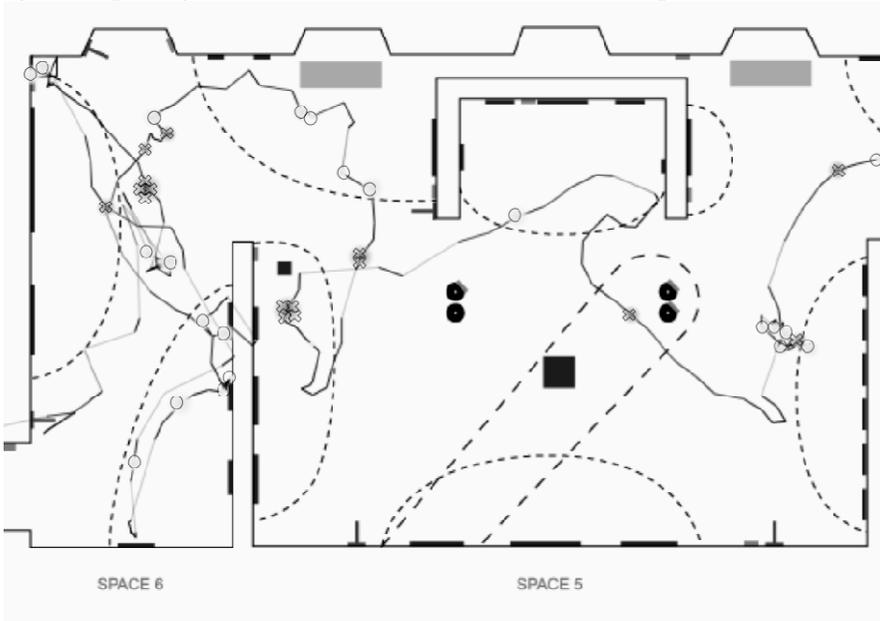


Fig. 5: Path and physiology of visitor SJ24

Several shifts of skin conductance ('x' markers) and of heart rate ('o') were recorded, significant skin conductance markers are displayed in the upper part of Space 6, inside the RoI of the work "Antibild" by Günther Uecker, which was shown in Fig. 1. In front of this work her trajectories become denser. One may notice that she also walks to the wall label in the corner next to this work. The reading of the label may cause shifts of heart rate. She then moves down Space 6 to view the other works hung there. Afterwards, SJ24 does not exit Space 6 to enter Space 7, but rather returns once more to explore the "Antibild". This work seems to exert a strong attractive pull on this visitor.

Interestingly, the other significant shift of skin conductance, a large 'x' marker, can be found in Space 5, probably referring to the work "Spaziale" by Lucio Fontana. Both the Uecker and Fontana works have a rather violent gesture: Fontana executed his work by cutting the canvas, Uecker by sticking long nails through the canvas, aggressively pointing at the visitors. To the other works, visitor SJ24 responds only sparsely and does not appear to be attracted or 'moved'.

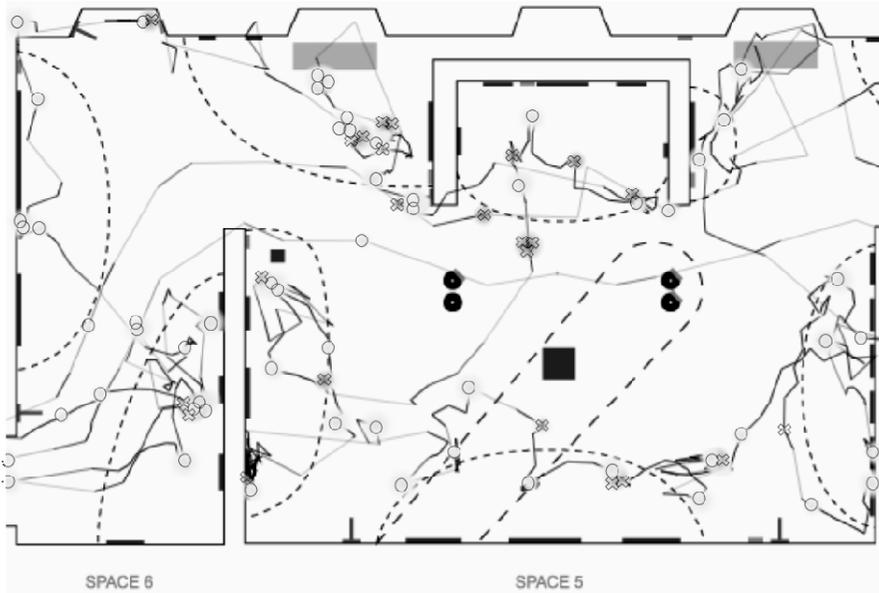


Fig. 6: Path and physiology of visitor SJ6.

Fig. 6 displays visitor SJ6, a 18-29 year old female, again with only little art affinity. This imaging dataset shows a high density of paths, which in some places are strongly accumulative (e.g. Space 5, bottom left corner). We recorded high frequencies of 'x' markers (shifts of skin conductance) as well as 'o' markers (shifts of heart rate). On several occasions, these markers overwrote and occluded the 'x' markers (visible in the original movies). Visitor SJ6 views the artworks thoroughly and in detail, moving from work to work. She reads carefully two of the five text posters (\perp), where several physiological markers occur. One may also notice that she traverses the exhibition halls two times quickly, prior to further exploration. This visitor perceives most of the tiny and often funny graffiti interventions by Nedko Solakov (represented by small gray rectangles on walls), responding physiologically (e.g., Space 6 top).

Discussion

The imaging data of the three individual paths in Spaces 5 and 6 show three different types of visitors. Idiographical analysis supported the validity of the recordings of both locomotion patterns and physiological responses and showed how they may relate to the artworks on display. The three examples do not allow generalizing. Statistical models of the complete sample of visitors included in the eMotion project, however, provide evidence that physiological responses are associated with aesthetic-emotional responses to the artworks (Tschacher et al., in preparation). For instance, heart rate variability recorded inside RoIs was significantly

predictive of which aesthetic assessments of the respective artwork were made in the interviews after the visits. Aesthetic quality, as well as surprise/humor attributed to a work, were both linked to increased heart rate variability in the respective RoI. This corresponds well with the occurrence and location of the markers in the imaging dataset.

The findings of the project support the idea that art reception may be an example of embodied cognition. The imaging of the visitors SJ6, SJ8, and SJ24 (Fig.s 4-6) indicates clearly how artworks have an attracting and sometimes also repelling effect on the spatial behavior of visitors. Artworks are like attractors in museum psycho-geography. Locomotion inside the RoIs of the works may be seen as a specific type of the regulation of closeness and distance in social space. The perspective of embodiment in recent psychology (Barsalou et al., 2003; Ramseyer & Tschacher, 2011) implies that motor actions always modify experiences and judgments, in addition to being mere results *of* experiences and judgments. This is obviously true also in the field of aesthetics, but still very little research exists on the issue.

A further aspect of embodiment concerns the physiological reactions we measured in the context of viewing exhibited artworks. Aesthetics research in the era of neuroscience has produced several findings that identify the neurological bases (there are more than one!) of aesthetic experience (Ramachandran & Hirstein, 1999). Such research increasingly implements sophisticated measuring apparatuses such as functional magnetic resonance imaging (fMRI) and event-related EEG (Kawabata & Zeki, 2004; Jacobsen, 2010). To date, however, the constraints placed on such research are restrictive. Generally, the stimuli are presented in unnatural environments (in the case of the MRI scanner, participants have to rest supine and motionless) and underlie strict experimental variation (e.g. only simple geometrical forms, not genuine artworks, are presented), so that the experimental situation per se becomes artificial and disembodied. As reported, we have chosen a different way in the eMotion project by focusing on a less demanding neuronal signal while optimizing ecological and external validity.

The art world, in concord with traditional art theory, usually expresses severe concerns when it comes to quantitative research of artworks and their aesthetic attraction. Critics argue that one cannot cover the singularity of art reception by averaging out the idiographic experiences. They fear that statistical and experimental methods may damage the very object of investigation. We regard some of these concerns as quite justified: Psychological research has a long history of studying conditions that have been simplified beyond recognition; in numerous instances, complex processes in embodied social systems were investigated by severely reducing complexity, process, and embodiment. This poses a danger for aesthetics research, which relates to complex

stimuli (i.e. artworks with their 'aura') that are being perceived by real embodied agents in their own time frames.

These well-justified concerns, however, must not rule out just any nomothetic research on art. Studying art is not in principle disastrous for art. To the contrary, there is a need for more empirical studies of art reception as an idiosyncratically human behavior, which is, judged by its social and psychological importance, rather under-researched. In the future, this research should better consider the external validity of its results and address real art in real environments.

Acknowledgements

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