

This article was downloaded by: [Zeppelin University GGMBH], [Martin Tröndle]

On: 12 March 2014, At: 09:04

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## Museum Management and Curatorship

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/rmmc20>

### The effects of curatorial arrangements

Martin Tröndle<sup>a</sup>, Steven Greenwood<sup>b</sup>, Konrad Bitterli<sup>c</sup> & Karen van den Berg<sup>a</sup>

<sup>a</sup> Department of Communication and Cultural Management, Zeppelin University, Friedrichshafen, Am Seemooser Horn 20, 88045 Friedrichshafen, Germany

<sup>b</sup> Media Artist, Berlin, Germany

<sup>c</sup> Kunstmuseum St. Gallen, St. Gallen, Switzerland

Published online: 10 Mar 2014.

To cite this article: Martin Tröndle, Steven Greenwood, Konrad Bitterli & Karen van den Berg (2014): The effects of curatorial arrangements, *Museum Management and Curatorship*, DOI: [10.1080/09647775.2014.888820](https://doi.org/10.1080/09647775.2014.888820)

To link to this article: <http://dx.doi.org/10.1080/09647775.2014.888820>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

## The effects of curatorial arrangements

Martin Tröndle<sup>a\*</sup>, Steven Greenwood<sup>b</sup>, Konrad Bitterli<sup>c</sup> and Karen van den Berg<sup>a</sup>

<sup>a</sup>Department of Communication and Cultural Management, Zeppelin University, Friedrichshafen, Am Seemooser Horn 20, 88045 Friedrichshafen, Germany; <sup>b</sup>Media Artist, Berlin, Germany; <sup>c</sup>Kunstmuseum St. Gallen, St. Gallen, Switzerland

(Received 14 November 2012; final version received 25 September 2013)

The prominence of the term ‘curating’ in the last decade stands at odds with the small amount of empirical research that has been conducted concerning the effects of curatorial work. Within the framework of the Swiss national research project *eMotion – mapping museum experience*, we have investigated how curatorial and spatial reconfigurations impact upon visitor attention. Methods, such as visitor tracking, physiological measurements, empirical social science, as well as the experimental setup of the exhibition space itself, have been developed for a fine arts museum to analyze curatorial effects on museum visitors. The visitors’ complex behavioral and physiological data was translated into cartographies. As a comparative analytical tool, the cartographies indicate differing spatial behaviors and visitor experiences in relation to various experimental re-hangings of artworks conducted throughout the course of the project. Our findings offer a series of unexpected insights for the fields of curatorial studies, museum management, visitor studies, and art reception.

**Keywords:** curatorial studies; exhibition planning; museum studies; tracking; physiology; empirical esthetics

### Introduction

The sociological approach developed by Bruno Latour attributes a strong significance to *things* (Latour 1999). He emphasized that not only do we use things, things also challenge us to adopt particular forms of acting. We do not control things, nor do they control us, instead, things and humans transform themselves equally in practice (Latour 2000, 218). Rather than assuming a subject/object dichotomy, he puts forth a network theory composed of actors *and* objects, as well as their interdependencies.

The impact of Latour’s reflections on exhibitions suggests that exhibitions cannot be considered solely on the basis of objects and meanings, or by situations and settings in isolation. Rather, according to Latour, exhibitions are complex networks of actions and force fields in which a rapport between visitors, architecture, and things can be generated. In attempting to understand these force fields and the epistemologies that are forged within them, it is not sufficient to focus one’s study on the supposedly self-determined, autonomous subject that intentionally ‘consumes’ exhibits. Nor is it appropriate to merely consider a passive observer of immersive exhibits who allows an exhibit to ‘transmit

---

\*Corresponding author. Email: [martin.troendle@zu.de](mailto:martin.troendle@zu.de)

impact,' as has become a more frequent trend in recent times. Instead, it is necessary to take into account what takes place within the network of interactions where attention is fostered, directed, and redirected.

Observing the process by which a visitor receives an artwork is plagued by an array of methodological difficulties, largely due to the fact that interactions between visitors and things in museums remain essentially invisible. For this reason, an interdisciplinary research team (from cultural sociology, curatorial studies, visitor studies, and art psychology, as well as technicians and programmers) carried out the research project *eMotion*, whereby imaging techniques were used to make visible certain aspects of the multilayered interplay occasioned by the constellation of exhibits and visitor experiences in a museum visit. The spatial behavior, direction, and speed, as well as physiological reactions of visitors touring the exhibition were recorded using technology developed specifically for this project. This research project was only possible through the development of high accuracy position-tracking, as well as the development of high-speed computers. Fortunately, we could use and integrate these technologies to deploy them for our research interests.

This article is one in a series from the Swiss national research project *eMotion – mapping museum experience*, which analyzes the museum experience experimentally. *eMotion* is a five-year research project involving scientists from various fields, technicians, artists, and practitioners ([www.mapping-museum-experience.com](http://www.mapping-museum-experience.com)). Research questions that have been analyzed in previous articles include: does esthetic experience correlate with embodied, physiological parameters? (Tschacher et al. 2012) How do social situations (companionship and communicating) influence the experience of art? (Tröndle et al. 2012a) What factors influence the assessment of an individual artwork and how does the manipulation of artwork affect visitor behavior? (Tröndle and Tschacher 2012) How does information pertaining to the artwork affect visitors' judgment of contemporary art? (Tröndle, Kirchberg, and Tschacher forthcoming a) and: what influence do sex and age have on art reception? (Tröndle, Kirchberg, and Tschacher forthcoming b)

In this article, we will investigate experimentally if and how curatorial and spatial arrangements impact upon visitor attention.

### **Recent studies**

Studying the affects and effects of curatorial arrangements on museum visitors has rarely been carried out within the field of museum studies. The literature to date has focused primarily on the historical development of displays and their respective epistemological implications (see for example Karp and Lavine 1991; Klüser and Hegewisch 1991; McCellan 2008; Serota [1996] 2000; Staniszewski and Museum of Modern Art 2001). Over the past few years, a succession of largely nonempirical, sociocultural oriented analyses have drawn attention to power asymmetries that exist within the museum as an institution, and examined the inclusion-exclusion dynamics of fine art museums (Bennett 2005; Groys 1997; Schubert 2000; Weil 2002). Two recent compendia related to museum studies (Carbonell 2007; Macdonald 2006) are clear indications of this mode of analysis where only two articles (both from the same author) out of 86 contributions address visitor studies (Hooper-Greenhill 2006, 2007).

In parallel to the aforementioned theoretical discussions surrounding museum practices, exhibition displays, and curatorial settings, our research methodologically connects to empirical visitor research, where behavior has been specifically observed in

exhibition spaces. When addressing the tracking of museum visitors, the early studies of Gilman (1923), Robinson (1928), and Melton (1933) must be noted. These authors investigated how museum visitors behave and move through the museum, the duration of resting in front of certain exhibits and why. This research tradition was continued and elaborated by the following exemplary authors: museum signage and visitor paths/trajectories (Klein 1993); socio-demographics and museum experience (Umiker-Sebeok 1994); museum labels and learning in the museum (Serrell 1998); the influence of spatial layout on visitor behavior (Bailey, Bronnenkan, and Hein 1998); socio-demographics and the influence of gender (Imamoğlu and Yılmazsoy 2009). For a detailed literature overview of empirical visitor studies, see Kirchberg and Tröndle 2012 as well as Tröndle et al. (2012a, 2012b). In contrast to these studies that relied on observation alone, our methodology measures visitor behavior to a much higher degree of accuracy (movement tracked per second, coupled with the positional precision of 15 cm). Secondly, we not only recorded the visitors' paths, but also their physiological data. Thirdly, we focused on curatorial questions by conducting rehanging experiments in the museum. To our knowledge, this is the first time a combination of these methods within the field setting of the museum has been successfully deployed.

### ***The current study***

We conducted a series of experiments in the St. Gallen Fine Art Museum in St. Gallen, Switzerland, between June and August 2009. Using differing artwork hangings/installations (Situations 0–3), we experimentally tested the effects induced by the rearranging of artworks. To do so, the participating curators formulated questions that examined the effects of certain configurations:

- (1) How does the exhibition space prefigure viewing conditions?
- (2) In what manner do certain curatorial settings produce effects on the museum visitor?
- (3) Does the hanging of an artwork determine the duration during which it is observed?
- (4) How does the rearrangement of artwork affect the museum visitor?

During a three-month period, several of the approximately 70 selected artworks were exchanged with others or were rehanging in different positions. Situation 0 represents the 'normal hanging,' and Situations 1, 2, and 3 represent cases in which certain parameters of the exhibition were changed in order to investigate our questions. Every situation was executed until a data-set from at least one hundred participants was collected, requiring two to three weeks per situation. After having conducted the experiment, the artwork was rehanging as in Situation 0, the 'normal hanging.'

It is important to note that the visitor behavior in a fine arts museum is not just dependent on the curatorial context, the artworks, and the architecture, but furthermore on the interactions of the museum visitors themselves and how many visitors are present in the exhibition halls. The museum was not particularly crowded during our study (as one might find in a 'blockbuster' exhibition). Altogether, 1881 people visited the museum between 5th June and 16th August in 2009, approximately 30 visitors per day. This moderate visitor number permitted undisturbed viewing conditions.

### The research site

The project investigated the exhibition *11: 1 (+ 3) = Elf Sammlungen für ein Museum [Eleven Collections for One Museum]*, curated in the St. Gallen Fine Arts Museum specifically for our research. *11: 1* was designed according to classical exhibition formats, that is, a presentation featuring the core collections of the museum. The biographic stories from private collectors who had contributed their own pieces to the public museum were exhibited, along with those from art lovers who had enabled the museum to obtain artworks through the creation of foundations (+ 3). The large text panels that profiled various patrons and their collecting interests were a distinctive aspect of the show. The structure behind the exhibition gave birth to the enigmatic title *11: 1 (+ 3)*: an exhibition dedicated to eleven private collections and three foundations, all of which have had a significant influence on the collection profile of the St. Gallen Fine Arts Museum.

The exhibition roughly outlined a tour through art history, ranging from Impressionism to the present day, including works from Claude Monet, Edward Munch, Giovanni Giacometti, Max Ernst, Le Corbusier, Hans Arp, and many more. Images of the exhibited artworks as well as installation views can be seen in the Museum's website.<sup>1</sup>

The floor plan (Figure 1) depicts the first five of eight exhibition spaces on the ground floor of the Museum (Spaces 1–5 from a total of 8). We have limited ourselves to the first five spaces, since the experiments discussed below were conducted there. Space 1 is the foyer, where the ticket counters and *eMotion* question booths were situated.

The dark gray shapes on the floor plan represent the artworks (Place IDs 1–45), and the dark gray squares (Place IDs 34, 43) represent sculptures. Each exhibit position is allocated a number (Place ID). The three light gray squares are benches, and the six small black circles represent columns. The 'T' denotes text panels displaying biographical information about the collectors (T 101–108). The artwork labels associated with single artworks (not shown) were mounted to the right of each artwork (Figure 1).

### Methods

As visitors bought their entry tickets to the Museum, they were asked if they would consent to participate in the research project. Subjects were required to be 18 years or

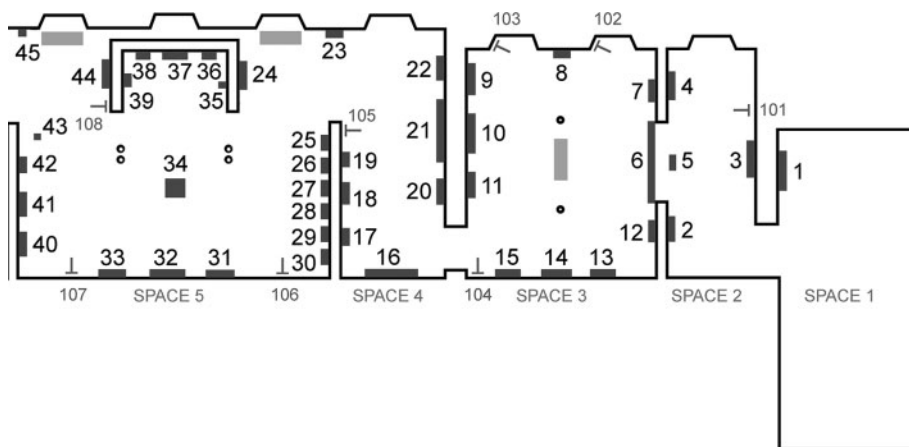


Figure 1. Floor plan of the ground floor, exhibition Spaces 1–5.

older; not to have previously participated in the *eMotion* project; to be a lone visitor or in small groups (no guided tours); and to be proficient in German or English. The 552 visitors who agreed to take part in the project received a sensor-glove that they wore during their museum visit. With this glove, they could move freely throughout the exhibition halls. The glove was specially manufactured for the research project and enabled us to record the path of the participant as well as two physiological parameters: heart rate (HR) and skin conductance level (SCL). A device integrated into the glove executed the position-tracking, recording a participant's position every second, and identified the location with a precision of 15 cm.

These data-sets were complemented by a standardized visitor survey filled out before the visitor entered the exhibition ('entrance survey') and an individualized survey following his or her visit ('exit survey'). The entrance survey consisted of questions investigating visit motivation, attitudes toward and expectations of art exhibitions, as well as the visitor's knowledge of art, coupled with standard socio-demographic variables. The individualized exit survey consisted of questions concerning visitor's behavior and experience in the exhibition – as a counterpart to the expectations recorded in the entrance survey. Furthermore, the items concerning artworks evoking significant reactions in the individual visitor were evaluated (longest viewing time, most significant fluctuation in heart rate and skin conductance) (for details, see Tröndle and Tschacher 2012). By doing so, we were able to qualitatively interpret the quantitative data (heart rate and skin conductance) collected during the exhibition tour of the visitors.

We won't specifically report here on the results of the questionnaires, because there were no specific questions asked with respect to the experimental re-hangings. The assessments of the single artworks in the exit survey, however, will be of importance when interpreting the collected physiological data. Using a visitor number ('Participant ID'), the computer-based entrance and exit surveys were electronically combined with the position and physiology data-sets of the individual visitors. This enabled us to correlate the physiological data and interpret the SCL and HR values in a meaningful way for a museum context (for details, see Tschacher et al. 2012).

One could argue that putting on the glove and being in the surveillance situation distorted the results. In order to test this, a control group without the glove answered the same surveys. The two groups with ( $n = 552$ ) and without ( $n = 24$ ) the glove were compared by variance analyses, in order to analyze if the visitors without a glove responded differently. All in all, the influence of the glove on the survey had minimal effects (for a detailed discussion, see Tröndle and Tschacher 2012).

### ***Reading the cartographies***

The data-sets obtained by the glove culminated in cartographic visualizations described below. In [Figure 2a](#), the thick black lines depict the floor plan, showing the exhibition rooms (Spaces 1 and 2). The artworks hanging on the walls are again depicted as gray rectangles and a text panel is also illustrated ('T'). The fine gray lines illustrate the paths taken by 30 randomly chosen museum visitors from Situation 2.<sup>2</sup>

The density of these lines indicates the speed at which a visitor moves, the fainter the line, the faster the visitor is moving; when the visitor would come to a standstill, the line darkens. This is clearly observable when taking a closer look at a single visitor path. The location was tracked every second – for each second a point is plotted and for the cartographies, a line was drawn from point to point. As such, the faster a visitor moved,

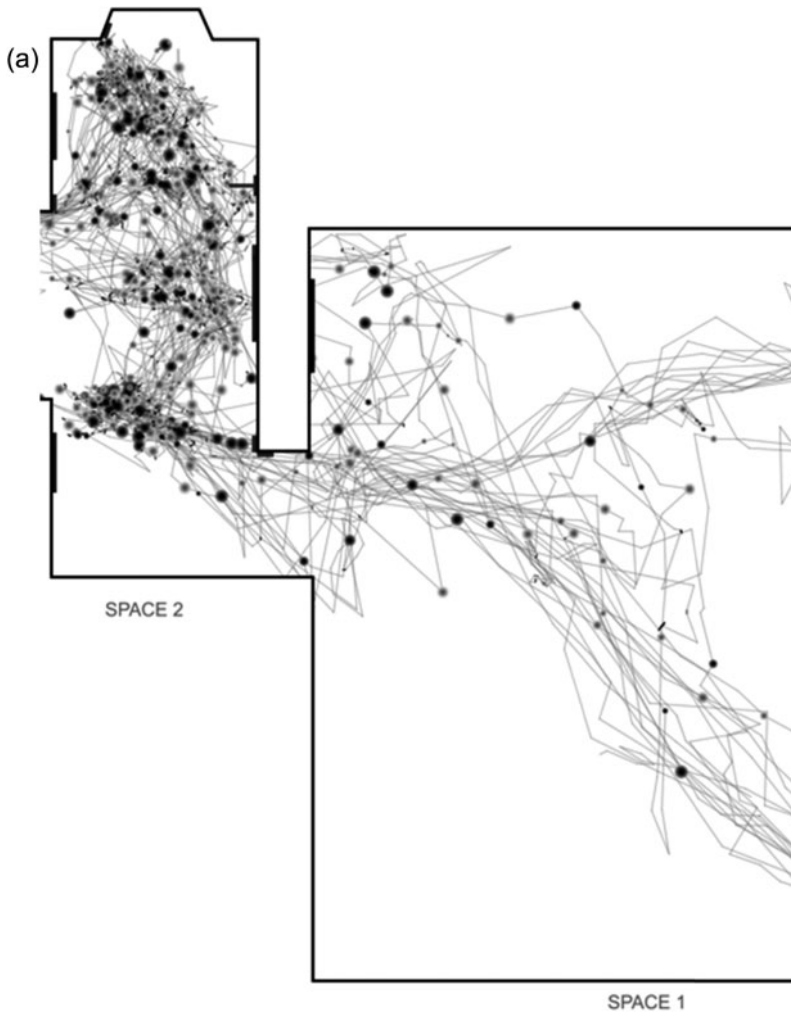


Figure 2. (a) Situation 2, Spaces 1 and 2. Paths and physiological reactions of 30 randomly chosen visitors. (b) Visitor moving quickly through Space 1, in which four points (measured at 1 second intervals) can be observed and (c) Visitor moving slowly through the same part of Space 1. Now 17 points and their respective vectors are observable.

the longer and straighter the line points in one direction (Figure 2b); conversely, a ragged, short-lined path indicates slower movement (Figure 2c).

A striking observation can be made in analyzing (Figure 2a). Coming from the two survey stations in Space 1 (left side), visitors crossing the entrance hall display only very minor heart rate variability (HRV) (bright gray circles) and skin conductance variability (SCV) (dark gray circles) markers. As soon as visitors enter the first exhibition hall (Space 2), however, and encounter the first artwork, their physiological reaction rapidly increases. The visitors' movement behavior changes as well, as shown by the darkened lines indicating arrested movement when the visitors remain motionless in front of the artworks. The round, blurry markers increase in size as the fluctuations in heart rate and skin conductance increase (on the process of developing the cartographies, see Tröndle et al. 2011).

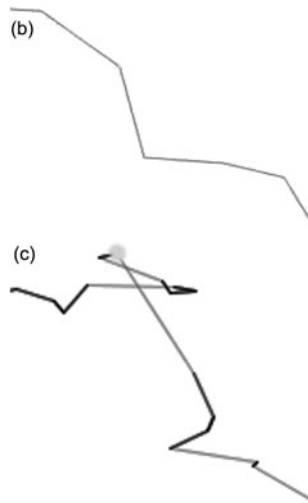


Figure 2. *Continued*

### ***Skin conductance fluctuations and heart rate variability***

What do skin conductance fluctuations and HRV mean for museum visitor studies? As mentioned earlier, participants were to assess the artworks that had produced the strongest variability/fluctuation on their tour through the exhibition in the exit survey. Showing them these specific artworks (as well as others) on a computer screen they were first asked: ‘do you remember this artwork in the exhibition?’ Upon their consent, a list of several questions opened up. Here the participants had to rate on a five-point Likert scale (1 = excellent to 5 = poor) the following aspects of the artwork: ‘content/topic,’ ‘artistic technique,’ ‘composition,’ ‘beauty,’ ‘the artist,’ ‘its importance in art history,’ ‘presentation of the artwork (hanging, scenography),’ and the ‘connection to the other artworks of the exhibition.’ Participants also had to answer the following questions: this artwork... ‘pleased me, I liked it’; ‘made me laugh’; ‘surprised me’; ‘made me think’; ‘moved me emotionally’; ‘frightened me’; ‘made me angry’; ‘made me happy’; and ‘made me sad’ (1 = absolutely agree to 5 = strongly disagree). Additionally, we asked visitors if the artwork could be considered to be ‘activating, stimulating’ or ‘soothing, relaxing’ and if it is rather ‘dominant, strong’ or rather ‘not dominant, weak.’

Altogether, 3555 single assessments of artworks were collected. After performing a factor analysis, HRV was found to correlate with items such as ‘curatorial quality’ (‘staged and presented well’; ‘connected to other artworks’ were two items the museum visitors were asked to rate in the exit survey), ‘surprise/humor’ (‘made me laugh’; ‘surprised me’; ‘made me think’); and ‘esthetic quality’ (the artwork is rated as ‘pleasing’; ‘beautiful’; ‘emotionally moving’; ‘well done with respect to technique’, ‘composition’ and ‘content’; ‘artist’ and ‘importance in art history’) (Tschacher et al. 2012). The ‘dominance’ of an artwork, that is, the extent to which it is perceived as strong and stimulating by a visitor, was found to correlate with skin conductance variability, shown by the dark gray markers. These findings pointed to a significant link between physiological responses of visitors and their subjective, esthetic-emotional evaluations of the artworks; in other words, esthetic experience was shown to correlate



significantly with physiological reactions. The light and dark gray markers not only show physiological reactions but also indicate meaningful processes in the context of esthetic experience and visitor research (Tröndle and Tschacher 2012).

### Results: analyzing the cartographies

We will now introduce the experimental settings conducted in Spaces 1–5 across the time spans of Situations 0–3. Subsequently, visitor behavior and their respective reactions to each setting will be analyzed through the cartographies.

#### *The ‘institutionalization’ of viewing: how does the exhibition space itself influence viewing*

In the foyer of the museum, next to the entry of the 11:1 exhibition, the following rearrangements were made: In Situation 0, Ferdinand Gehr’s *Angesicht* (1992) (Figure 3a) was hung in Place ID 1 (for the Place IDs see Figure 1).

In Situation 1 (Figure 3b), no painting was hung in ID 1 and in Situation 2, Lovis Corinth’s *Selbstbildnis mit schwarzem Hut und Stock* (1911) was hung (Figure 3c).

The artwork by Corinth, *Selbstbildnis mit schwarzem Hut und Stock* [Self-portrait with Black Hat and Walking Stick] and that by Gehr, *Angesicht* [Portrait] are both of similar size and were hung in the same position. While both are portraits, one is figurative and the other abstract.

The rearrangements in Situations 0, 1, and 2 were carried out in order to investigate the following questions: do visitors notice artworks when they are positioned outside of the exhibition space? And, to what extent does the exhibition space itself influence the viewing? In order to answer these questions, the cartographies of the museum experience from the three situations were analyzed (Figure 4a–c).



Figure 3. (a) Situation 0, Foyer: Gehr’s *Angesicht* (tempera on canvas, 100 × 90 cm), (b) Situation 1, Foyer: bare wall and (c) Situation 2, Foyer: Corinth’s *Selbstbildnis...* (oil on canvas, 110 × 90 cm).



Figure 3. *Continued*

The artworks are indicated by the slim dark gray rectangle on the wall on the top left-hand side of the passage (Figure 4a and c). It is apparent that in all three situations, comparatively few participants were attracted and remained standing in front of the artworks. There are low densities from both the ‘attraction indicators’ (HRV and SCV markers), reflecting an esthetic experience, and the visitor paths, showing attractions. This particularly stands out when a comparison is made with the following figure (Figure 5), which also depicts the first exhibition room (Space 2). In this example, we have again displayed 30 randomly chosen visitors, but this instance references a different experimental setting (Situation 0). One can see the same effect as in Figure 2, now displaying the data of 30 other visitors.

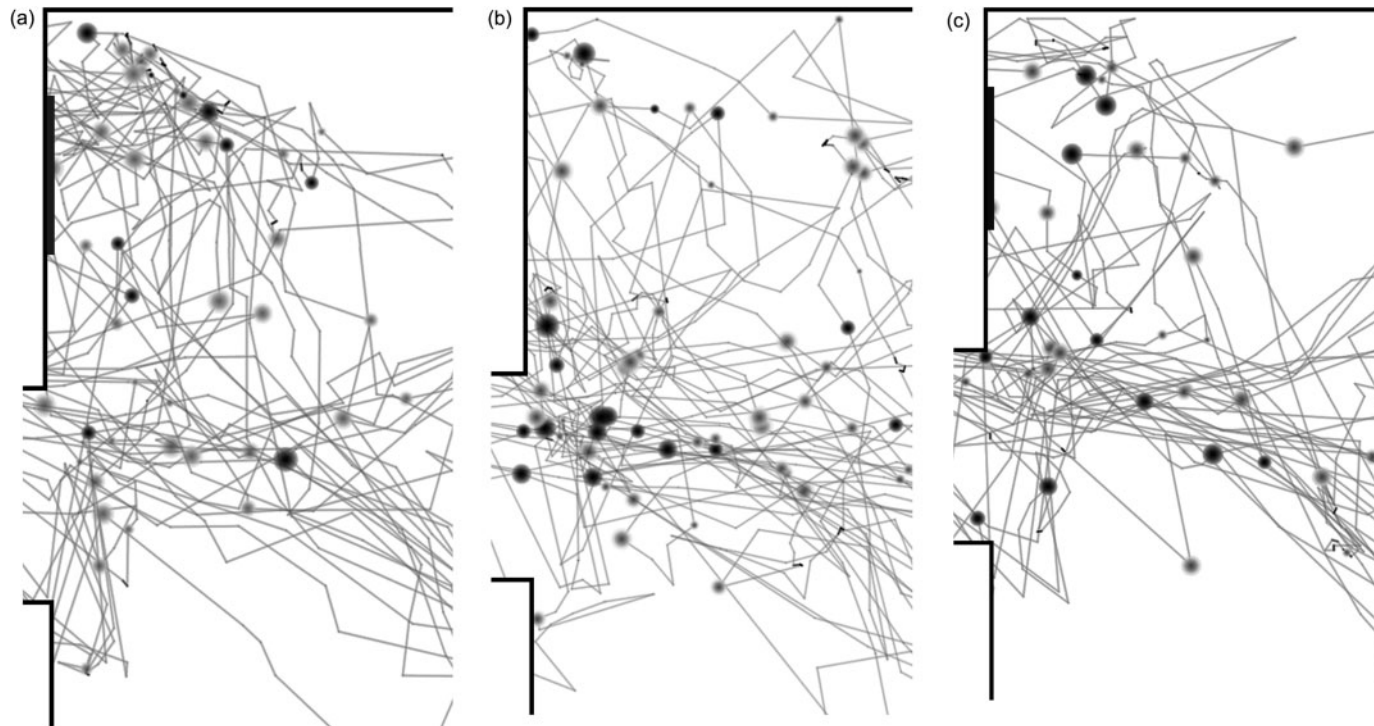


Figure 4. (a) Situation 0: Ferdinand Gehr, (b) Situation 1: bare wall and (c) Situation 2: Lovis Corinth.

Note: Each figure shows the paths and physiological reactions from 30 randomly chosen visitors for one experimental setting (Situation). Altogether the paths from 90 visitors are displayed, permitting a comparative visual analysis.

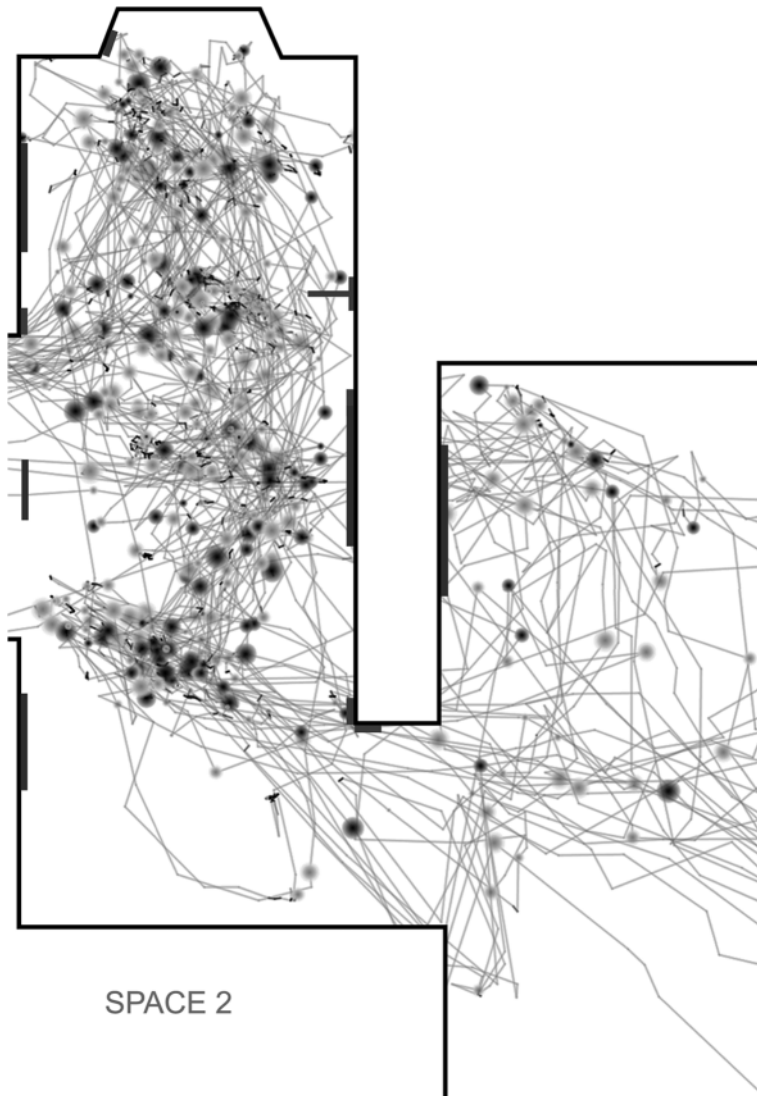


Figure 5. Situation 0, Spaces 1 and 2.

Exchanging *Angesicht* for *Selbstbildnis mit schwarzem Hut und Stock* had only a very minor effect on participant reactions. It made little difference if a picture hangs in the foyer or not, or whether it is figurative or abstract. The fact that visitors did not linger in the foyer carries more ramification than the artworks displayed in this space. Compared to the artworks in the foyer, those contained within the clearly delineated exhibition space were observed more closely by visitors. Summing up, we conclude from this first experiment that artworks which do not have the ‘proper’ environment (‘proper’ understood in a museum context as the exhibition halls instead of the foyer) have difficulties in attracting visitors’ attention or generating esthetic experience. There seem to be two differing modes of observation: an ‘esthetic mode of viewing,’ which causes

strong locomotive and physiological effects and a varying ‘everyday perception,’ which does not produce these effects.

### ***The esthetic mode of viewing***

Looking once more at [Figures 2](#) and [5](#) (with 30 participants each time,  $n = 60$ ) and the difference of the visitor reactions between Spaces 1 and 2, it is evident that the painting by Gehr, whose bright colors immediately catch the eye, as well as the more renowned *Selbstbildnis mit schwarzem Hut und Stock* by Corinth, did not attract attention in the same manner as the four artworks displayed in the following room (Space 2).

In Space 2, visitors saw Edvard Munch’s (*Bildnis Wilhelm Wartmann*, Place ID 2) [Portrait of Wilhelm Wartmann]; Ferdinand Hodler’s (*Selbstbildnis*, Place ID 5 [Self-portrait]) above the entry to Space 3; Claude Monet’s (*Palazzo Contarini, Venedig*, Place ID 3), and Max Liebermann’s (*Atelier des Malers*, Place ID 4) [The Painter’s Studio]. The differences in attention seem to be caused by a specific conditioning of visitor behavior, causing their attention to increase as soon as they crossed the threshold into the ‘actual’ exhibition space. This entrance was curatorially marked and clearly distinguishable: by changing the wall color (Space 2 is painted a bright yellow); by the signage; architecturally, by changing floor surfaces (wood floor); and by the entrance situation. All of these induced a different observational mode at the exact moment the visitor traversed the threshold (for a view into Space 1, see [Figures 10b](#) and [12](#)).

It is clear that the cause of increased attention does not lie in the phenomenology of the artworks. Instead, attention is dependent on whether artworks occupy a particular position, such that they are perceived to be part of an exhibition. The context is crucial for visitors; only when the visitors enter into a different viewing mode is the esthetic experience intensified. This is clearly observable in the striking physiological reactions (HRV and SCV) and the changing spatial behavior.

To our knowledge, this ‘esthetic mode of viewing’ is shown here, empirically, for the first time. The physiology shows such an esthetic mode of viewing as an embodied reaction. Noteworthy is not just the difference of embodied reactions between Spaces 1 and 2, but also that the visitors’ shift in intensity occurred precisely upon entering Space 2, changing the mode of perception into an ‘esthetic mode of viewing’ (see also Tröndle and Tschacher [2012](#)).

### ***Experimentation with hanging conventions***

In the second exhibition room (Space 3), we investigated the effect of curatorial settings. [Figure 6](#) shows an overview of Space 3.

### ***Compositional hanging versus single-line hanging***

In the first arrangement (Situation 0), Ferdinand Hodler’s *Linienherrlichkeit*, Place ID 10 [Beauty of Lines], depicting a female nude, was positioned between two of his mountain landscapes ([Figure 7a](#)). The nude dominated the landscapes, as it is larger in size. Nicholas Serota ([[1996](#)] [2000](#), 8) refers to such a configuration as a ‘compositional hanging,’ which he describes as clearly distinguishable from the ‘single-line hang’ (Serota [[1996](#)] [2000](#), 7). In addition, the comparatively large nude hung directly in the visitor’s line of sight upon entering the room.

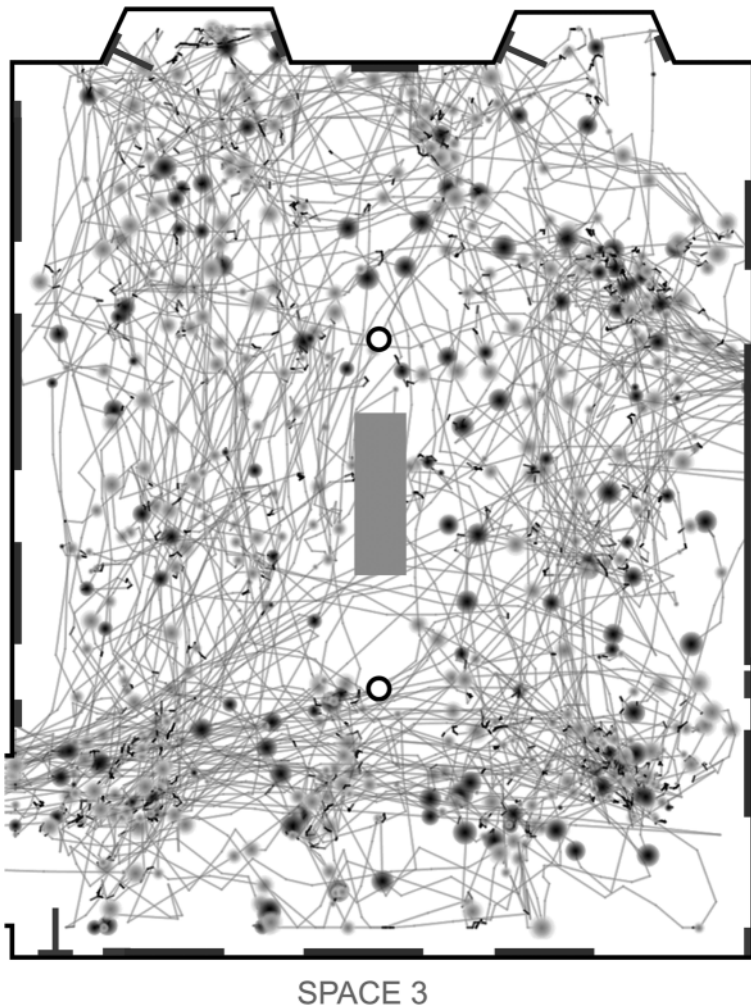


Figure 6. Situation 0, Space 3.

Note: In the middle of the two columns (black circles), the gray rectangle represents a bench. The 3 'T's represent information texts on the walls (100 × 60 cm). The gray rectangles represent the artworks hanging on the walls. The labels for the artworks, always positioned to the right of the works, are not depicted. Visitors enter the room from the mid right-hand side and exit bottom left.

The exhibition curators assumed that the central painting in this configuration would act as the 'star' of the space and, as a result, receive the most attention. Can this assumption be proved through the cartography of the space?

Surprisingly, the greater exposure of the nude did not lead to an increase in visitor attention. As can be observed in [Figure 7b](#), the paths of the participants are almost parallel to the three artworks by Hodler. None of the three tended to monopolize the visitor's attention. Few visitors approached *Beauty of Lines* in order to read the wall label, affixed on the right-hand side (otherwise more paths would bend closely to the wall at the right-hand side of the artwork, to read the small type). Additionally, the physiological



Figure 7. (a) Situation 0, *Linienherrlichkeit. Der Mettenberg; Linienherrlichkeit*, Place ID 10; *Das Breithorn* (from left to right); all by Ferdinand Hodler. (b) Situation 0, Space 3: *Linienherrlichkeit*. The three artworks by Ferdinand Hodler. In the center is *Beauty of Lines*. The text panel at the window is indicated by the gray ‘T.’

reactions are not pronounced. All in all, this hanging evoked a rather diffuse visitor attention, and the visitor reaction is less pronounced than it is compared to the other artworks in the same room (Figure 6).

In Situation 1, the nude by Hodler was replaced by his mountain landscape, *Thunersee mit Stockhornkette*, to test the effect of a single-line hanging (Figure 8a).

Following this rearrangement, a prompt change in the reception behavior became evident. While visitor movement was rather diffuse in Situation 0, Situation 1 resulted in recognizable centers of observation.

In the rehung situation, visitor paths became tangled, particularly in front of the artworks *Das Breithorn* and *Der Mettenberg*, indicating these points to be centers of observation (Figure 8b). Here, the visitors paused to inspect the artworks more intensely. The rearrangement evoked a noticeable difference – the opposite of the expectations from the curators.

Another striking observation is that the participants tended neither to read the labels associated with each artwork, nor did they tend to approach the artworks closely. This becomes obvious when analyzing the direction and proximity of the visitors’ paths, for one would have to approach a label quite closely to read it for at least one second. If the visitors were to have done so, it would be visible in the cartography.

In comparing the two configurations from Situations 0 and 1, Situation 1 is more representative of the conventional nonhierarchical ‘single-line hang’ at eye level that has

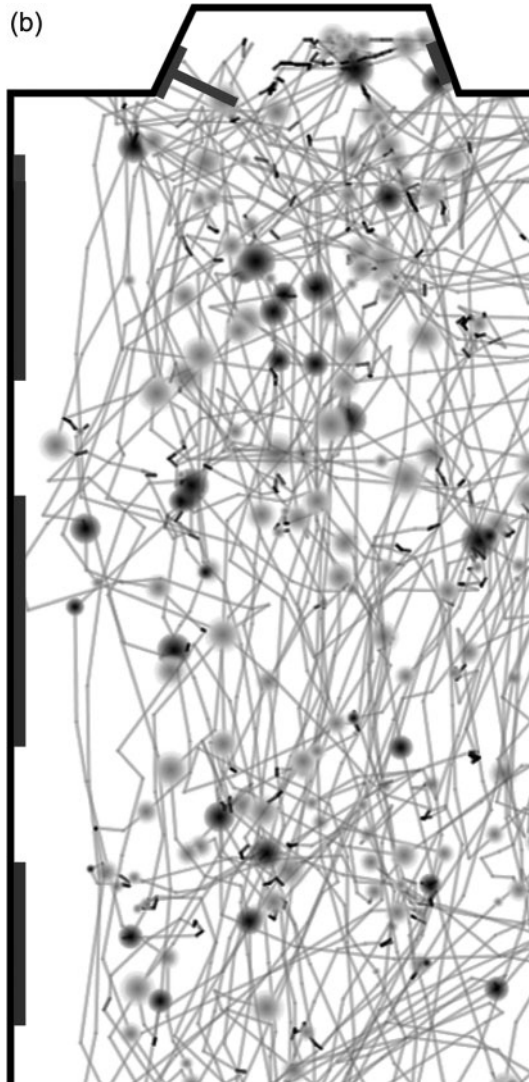


Figure 7. *Continued*

been developed since the 1980s (Serota [1996] 2000). According to this convention, every painting claims the same prominence. In contrast to Situation 1, the configuration in Situation 0 was dominated by the central painting. As a result, the visitors perceived the artworks more as a wall ensemble (a triptych-like configuration), than as individual artworks, producing the effect of visitors standing at a large distance from the artworks, and not stopping in front of each individual painting. In conclusion, we might say that only this small difference of hanging an ensemble-like triptych or three single artworks implicitly affects visitors' locomotion and their esthetic perception.





Figure 8. (a) Situation 1, *Thunersee mit Stockhornkette*. Now in the center: Hodler, *Thunersee mit Stockhornkette*, Place ID 10. (b) Situation 1. Now in the center: *Thunersee mit Stockhornkette*. Note: The straight black line in the cartography is a tracking failure and should be ignored.

### ***Does the hanging of an artwork determine its observation time?***

In order to clarify the extent to which the attention attracted by *Linienherrlichkeit* was a consequence of its central placement in the room, an additional arrangement was carried out. The artwork in front of which visitors remained the longest in this space was exchanged with the artwork in front of which visitors spent the least amount of time. The total that all visitors remained in front of Hodler's *Beauty of Lines* (Place ID 10) was 2 424 seconds. In contrast, 782 seconds was the total amount of time visitors remained in front of *Bauer auf dem Felde bei Maloja* [Farmer on the Fields at Maloja] by Giovanni Giacometti (Place ID 13). Based on this data, the two works *Beauty of Lines* and *Farmer on the Fields at Maloja* were exchanged, so that the former was to be seen in a corner of the room, whereas the latter was ascribed a central position (Figure 9a and b).

In Situation 0, the painting *Beauty of Lines* was approached 207 times (for more than three seconds) and it was examined for an average of 12 seconds. The painting *Farmer on the Fields at Maloja* was approached 75 times and examined for an average of 10 seconds. Exchanging the two artworks had little effect on the observation time and frequency related to *Farmer on the Fields at Maloja*. The average observation time per visitor increased in Situation 3 from 10 to 11 seconds, even though the artwork now hung centrally in the line of sight. The total observation time and the number of participants that remained within this region for more than three seconds varied negligibly between Situations 0 and 3.

By contrast, the rearrangement caused considerable variation in the reception of *Beauty of Lines*. While this artwork was observed for the longest period of time in Situation 0 (total

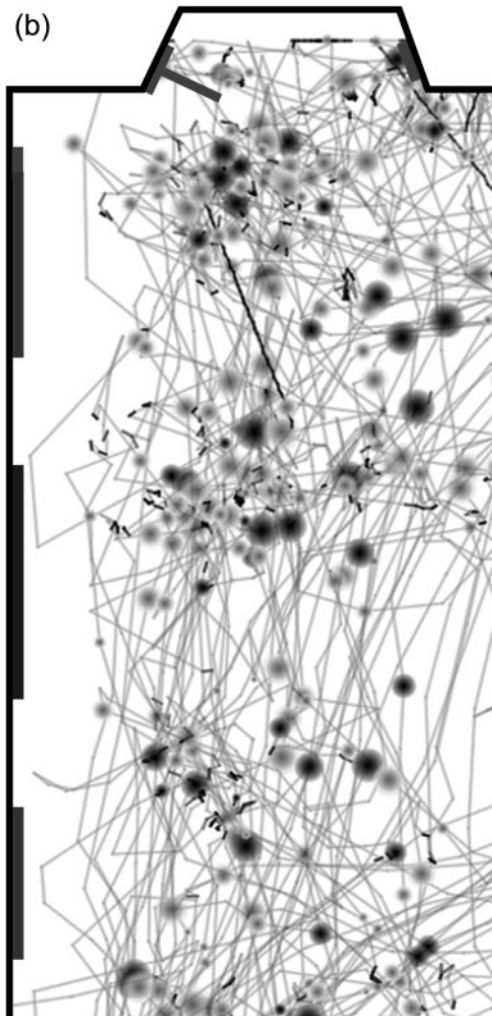


Figure 8. *Continued*

duration of 2284 seconds) in Space 3, the corresponding total observation time in Situation 3 was calculated at a mere 134 seconds. The number of visits decreased from 207 to 17, and the observation time per participant fell from 12 to 8 seconds!

Overall, the repositioning of *Farmer on the Fields at Maloja*, from the left-hand corner to a central location, did *not change* the manner in which the artwork was received, in terms of either the total and average observation times, or in terms of the number of visits. The distribution of visitor attention remained relatively unchanged. By contrast, the attention attracted by *Beauty of Lines* at its new position in the corner, quite literally, dissolves.

It can be concluded that the influence the artwork's position has upon its reception by the observer is not to be underestimated. However, while the exposed positioning of the small, less observed artwork attracted only a minor increase in visitor attention, the large



Figure 9. (a) Situation 3: in the center now, Giacometti's *Bauer auf dem Felde bei Maloja*, (b) Situation 3: Experimental rehangng of *Linienherrlichkeit*. Hodler's *Beauty of Lines* in a corner (Place ID 13).

artwork embedded in the ‘composition’ hanging evoked very minor arousal in the visitors and did not ‘arrest’ them into taking a closer look.

Apparently, dominant artworks are not able to organize the ‘force field’ of the exhibition space around themselves from every position in the room. Rather, based on the experimental findings presented, this force field appears to be possible only from particular locations.

### *What effects do curatorial settings evoke?*

In Space 2, yet another experimental rehangng followed. In Situations 0 and 1, Hodler’s *Selbstbildnis* [Self-portrait] hung above the entry to Space 3, while in Situation 2, the painting was removed and the site remained empty (Place ID 5).

This curatorial positioning was performed rather tongue-in-cheek where Hodler’s gaze landed on *Beauty of Lines*, the nude in the next room (Figure 10a). The questions to be answered were whether such an arrangement would be noticed by the visitors, and, if so, what were the effects of the arrangement. Can a difference be perceived in either physiological activity or in the visitors’ spatial behavior between Situations 0 and 2? We again analyzed the paths and physiological reactions of 30 randomly chosen visitors from Situations 0 and 2 (Figure 11a and b).

Comparing Situations 0 and 2 (Figure 11a and b), the differences from the two experimental hangings were marginal. The hanging above the entry to Space 3 was less pronounced and different than had been expected. This re-hanging seems to have only slightly reorganized the distribution of attention, so we may conclude that this ‘curatorial quirk’ did not work out. But another phenomenon, which can be detected in the two

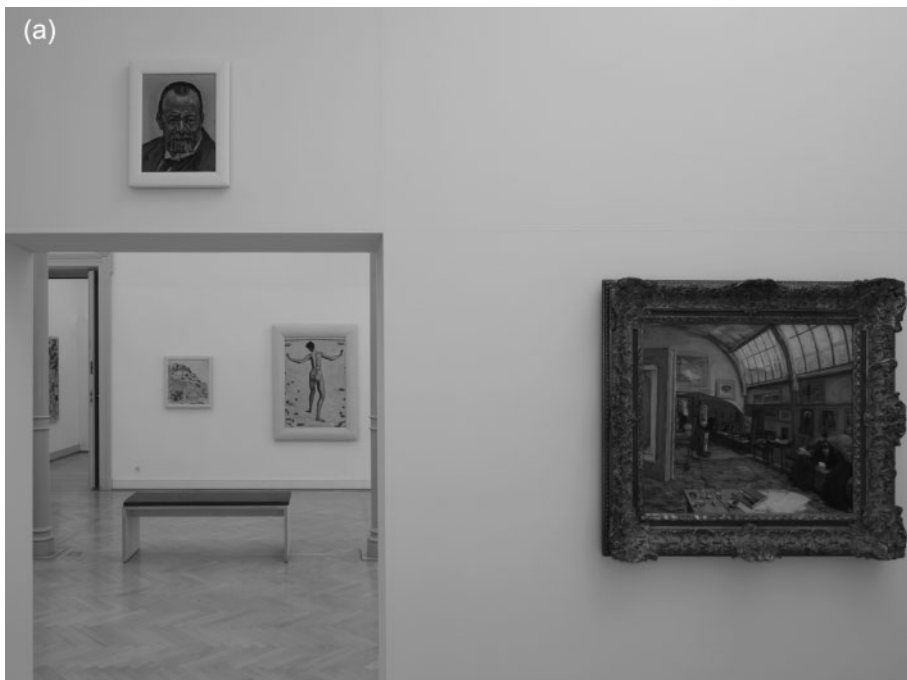


Figure 10. (a) Space 2, Situation 0: above the passage Hodler, *Self-portrait*, Place ID 5 and (b) Space 2, Situation 2; Place ID 5, empty.



Figure 10. *Continued*

figures, is rather interesting: nearly none of the visitors approached the artwork by Edvard Munch (Place ID 2). Why was this so?

### ***Effects of the spatial arrangements***

In order to further analyze the interplay of rearrangement in an entire space, or within a row of paintings and their effect on the direction of visitor attention, several experimental reconfigurations were carried out in Space 5. Figure 12 shows an overview of the space, with its four columns, a U-form built into it (partial walls), two benches (gray rectangles) and a sculpture in the middle of the space (gray square).

### ***Rearrangement of a series of artworks***

On the right-hand side of this exhibition space, a row of six small-scale, intimate artworks by Julius Bissier (Place ID 25–30; Situation 0, Figure 13a) were installed.

The first re-hanging (Situation 1) involved exchanging the first artwork and the last in the row, in order to observe the effect of rearrangements on the manner in which artworks are received. In Situations 2 and 3, the artworks were hung as in Situation 0, the original hanging. Paths and physiological reactions from 30 randomly chosen visitors from Situations 0, 1, 2 and 3, in front of Julius Bissier artworks, are shown in Figure 13b–e.

The cartographies (Figure 13b–e) showing physiological reactions and visitor paths reveal varying densities across all four situations. In Situation 0 (Figure 13b), very few of the 30 participants represented appear to be concerned with the row of Bissier artworks. In Situation 1 (Figure 13c), however, the highest density can be observed. Situation 2

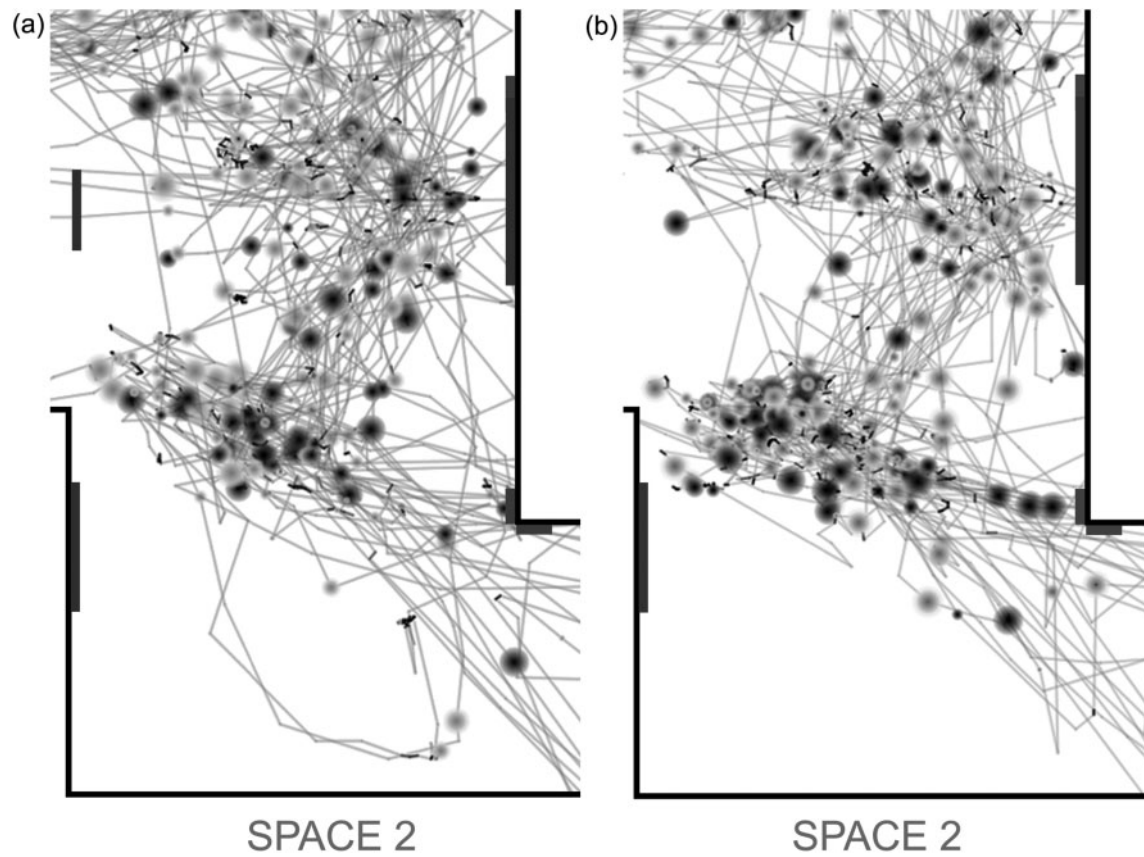


Figure 11. (a) Space 2, Situation 0: *Self-portrait* and (b) Space 2, Situation 2: empty. On place ID 2, Edvard Munch, on place ID 3 Claude Monet.

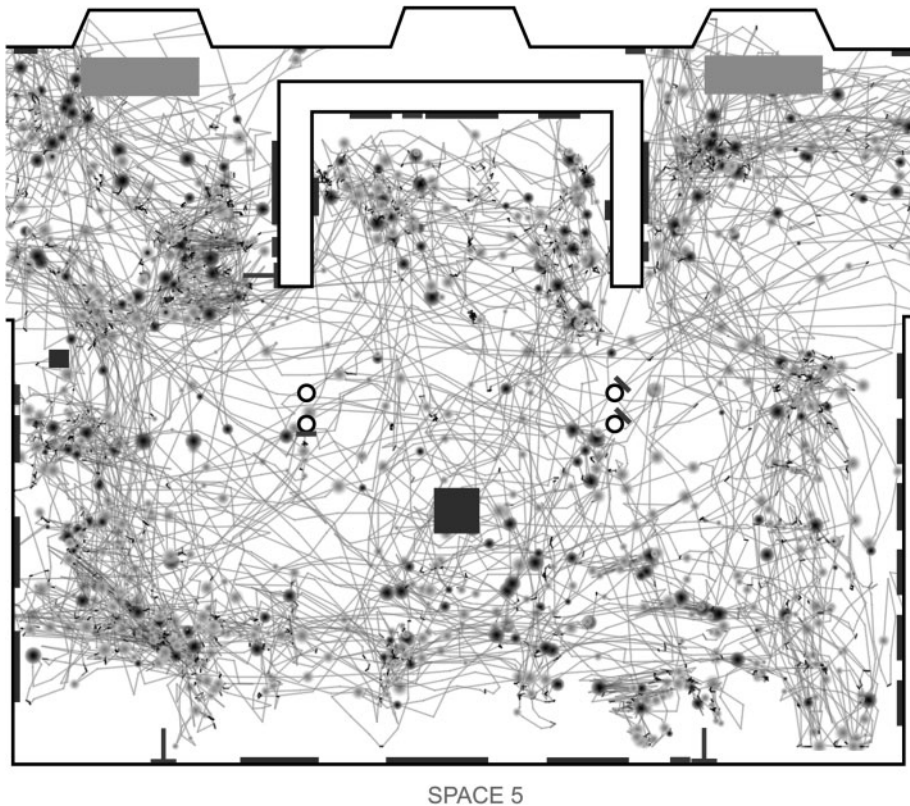


Figure 12. Bird's eye view: Situation 0, Space 5. The paths and physiological reactions of 30 randomly chosen visitors are displayed.

Note: The visitors enter the room from above the right-hand side and leave it above on the left-hand side.

(Figure 13d) indicates a slightly greater density than Situation 0, but a considerably higher density than Situation 3 (Figure 13e). Situations 3 and 0 display similar line densities and visitor reception patterns.

In each of the four mappings, the first artwork (upper right on the figure) and, to a certain extent, the second artwork were examined by visitors in detail. Thereafter, visitor interest began to dwindle and grew weaker along the Bissier row, independent of the hanging order. Not surprisingly, a hierarchy can thereby be deduced, in that the first painting in a relatively balanced series will receive the most attention, and this attention and the visitor's affected state declines considerably as the visitor moves along the row.

Highly similar visitor behaviors can also be observed in numerous situations where artworks were displayed in a row (e.g. a series of works by On Kawara in Space 8, not shown), as well as in the U-shaped arrangement of works by Paul Klee in Space 5 (hung in a U-form, Place ID 35–39), or the conceptual works by Max Bill and Josef Albers (hung in an L-form, Space 6, not shown). In these 'row cases,' it did not matter if the artworks were hung in an I-, an L-, or a U-form, it was always the first work that received the most attention.



Figure 13. (a) Situation 0, Julius Bissier: *15.8.62, 3.3.56, 28. April 63, 2.1.62, 10.6.56, Ostertag 58*. (b) Situation 0, (c) Situation 1: rearrangement, the first and the last artwork in the row were exchanged, (d) Situation 2. Hung as in Situation 0, (e) Situation 3. Hung as in Situation 0 and (f) Situation 0, Arp's sculpture *Entre Lys et Défense* (Place ID 34) and artworks by Bissier.

### *The organization of force fields around sculptures*

A considerable difference in overall line densities can be observed in the Space 5 mappings (Figure 13b and c). What is the source of this difference? It is obviously connected with another rearrangement within the same exhibition space that exerted a stronger effect on the visitor reception of the Bissier row than was expected by the curators and research team. In addition to the re-hanging of two artworks in the Bissier row, an additional rearrangement involved displaying a sculpture by Hans Arp, *Entre Lys et Défense*, in the middle of the room (Situations 0 and 3), removing it (Situation 1), and then installing a different, much smaller sculpture, also by Hans Arp (*Schematisches Relief*) [Schematic Relief], in the same position, (Situation 2, Figure 14b).

The influence of the artwork order – that is, the large sculpture, followed by an empty space, followed by a smaller work, followed again by the large sculpture – on visitor behavior is clearly observable in Figure 15a–d. The visitor paths between the two columns and entry into Space 5 vary in an interesting fashion. As a result of the installation of the sculpture, the visitors were more likely to move away from the walls (Figure 15a).

It was evidently not the rearrangement of the two Bissier artworks that elicited varying densities in visitor behavior reactions (Figure 13b–e). Rather, it was the effect of the sculpture on the rest of the space (Figure 15a and 15b).

The sculpture led participants away from the Bissier drawings when placed in the middle of the room in Situation 0 (Figure 15a). In Situation 1 (Figure 15b), with no sculpture, the participants oriented themselves along the wall and did not pass through the middle of the room. In Situation 2, a smaller sculpture, *Schematic Relief*, was positioned in the same space as in Situation 0 (Figure 14b), but due to its smaller dimensions, it did



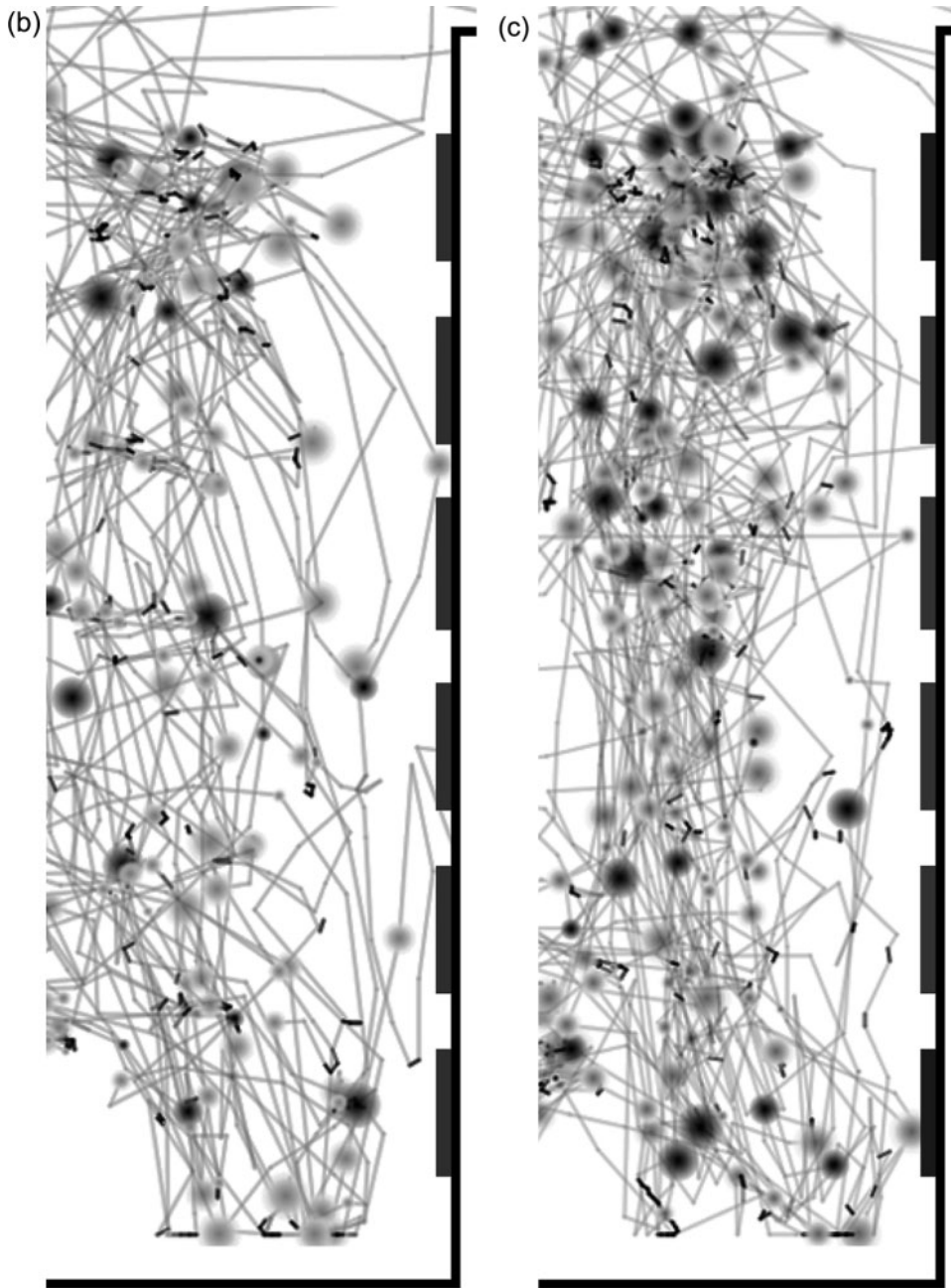


Figure 13. *Continued*

not attract the visitor's gaze from a distance in the same way as the larger sculpture did in Situation 0. This example illustrates the extent to which a new spatial 'weighting' is established in the exhibition space when only one exhibit position is altered, and the extent to which interferences between artworks influence visitor attention.

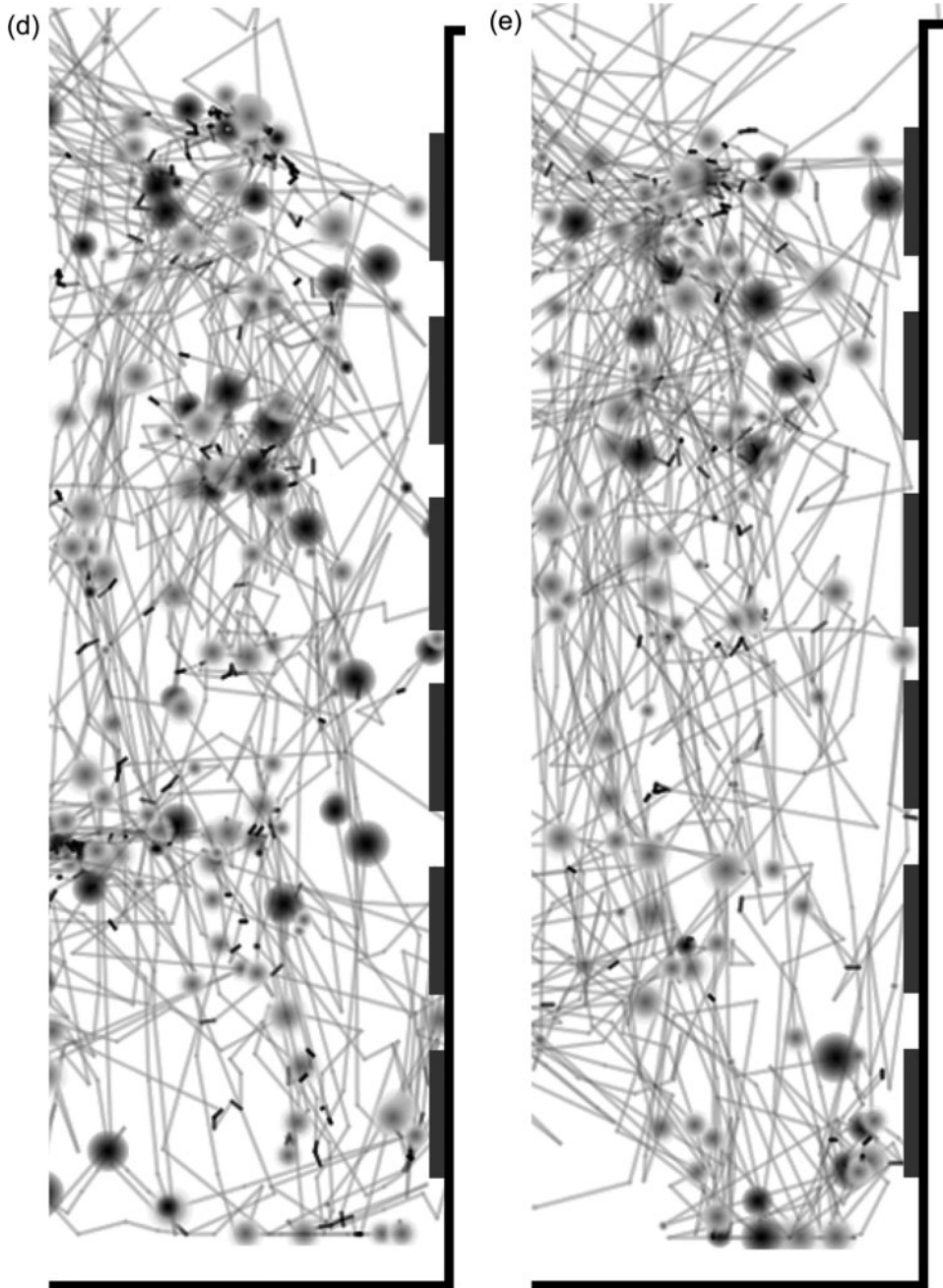


Figure 13. *Continued*

Furthermore, the participants' 'reading activity' (after having observed the Bissier row) was considerably higher in Situation 1 than in all other experimental situations. This was determined by comparing the visitor reactions in front of the information texts 'T' 106, which is most obvious when comparing Situations 0 and 1 (Figure 16a and b).



Figure 13. *Continued*

### ***Counterintuitive effects***

The curator intended a correspondence and complementarity between the two abstract but dynamic forms, luring the visitors to discover the relationship in both senses of the word (marital and formal). [Figure 17a](#) shows the intended correspondence between the two

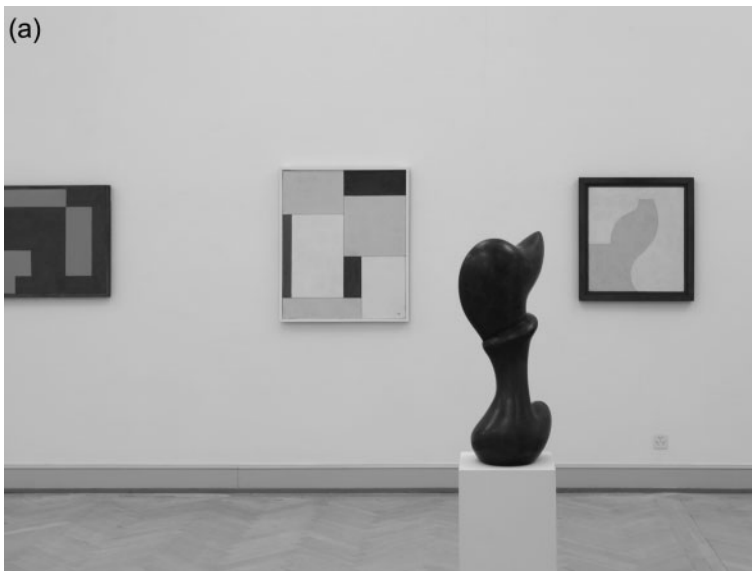


Figure 14. (a) Situation 0, Hans Arp, *Entre Lys et Défense* (sculpture) and Sophie Taeuber-Arp, *Gelbe Form*, Place ID 33 [*Yellow Form*] (painting on the right-hand side) and (b) Situation 2, Hans Arp, *Schematic Relief*.



Figure 14. *Continued*

artworks, the sculpture by Hans Arp *Entre Lys et Défense* and the work hanging on the wall to the right, made by his wife Sophie Taeuber-Arp, *Gelbe Form* (Yellow Form) (Figure 14a).

In order to demonstrate the effect of rearrangements on the visitors' reception behavior, Situations 0 and 1 will be compared once more in the same space, now depicting the area of the sculpture *Entre Lys et Défense* (Place ID 34) by Hans Arp and the painting *Yellow Form* (Place ID 33) by his wife Sophie Taeuber-Arp in Space 5.

Comparing Figures 17a and 17b, it is clear that the arrangement in Situation 1 resulted in less visitor movement in the middle of the space. Figure 17b shows visitors proceeding either along the wall alongside the artworks, or directly across the space to approach the artworks. In Situation 0 (Figure 17a), however, visitors moved around the sculpture, resulting in a chaotic and less directed visitor movement. In addition, a greater degree of physiological significance was evoked in Situation 1 by the three artworks to the left and right, as well as by the wall text in between them (text panel 'T' 107). In the absence of the sculpture, visitor paths were rather directed toward the wall-based artworks.

The original intention of the curatorial setting was to enable an experiential connection between the sculpture *Entre Lys et Défense* and Sophie Taeuber-Arp's *Yellow Form*. The opposite effect, however, was observed: *Entre Lys et Défense* almost fully overshadowed the visitor's view of *Yellow Form* (see Figure 17a and b).

Considering the experiments with the two sculptures in the exhibition space, one might conclude that the installation of the sculptures (especially the larger sculpture) elicited wide-reaching effects on almost all artworks in the same room. They organized the visitor locomotion far beyond the space physically occupied by the sculpture. The staging of the space had a considerable influence on visitor art reception (as can be seen in the physiological responses), and the sculptures evoked strong force fields interfering with other artworks.

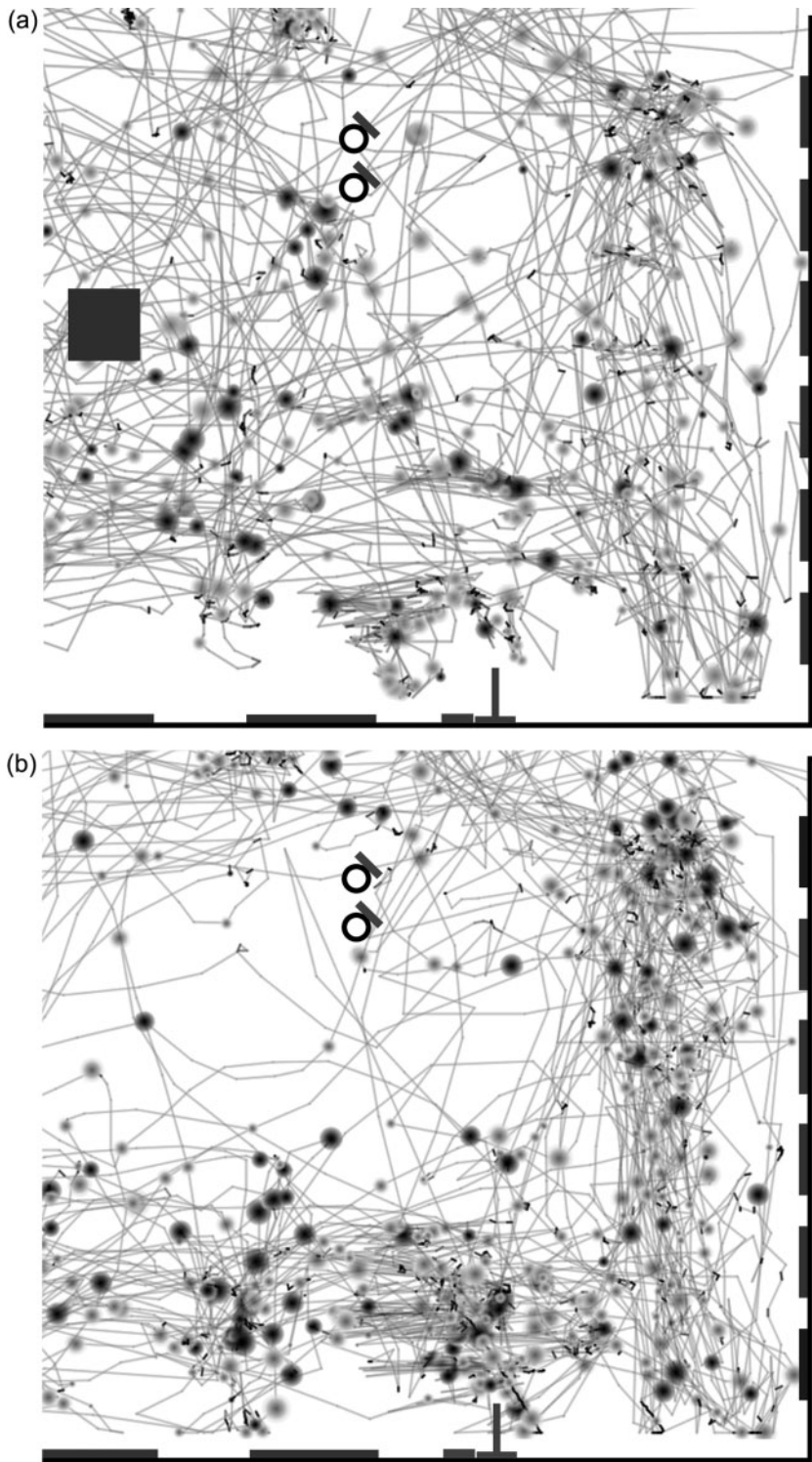


Figure 15. (a) Situation 0, with the sculpture *Entre Lys et Défense*, (b) Situation 1, empty, (c) Situation 2, the small sculpture *Schematic Relief*, (d) Situation 3, *Entre Lys et Défense*.

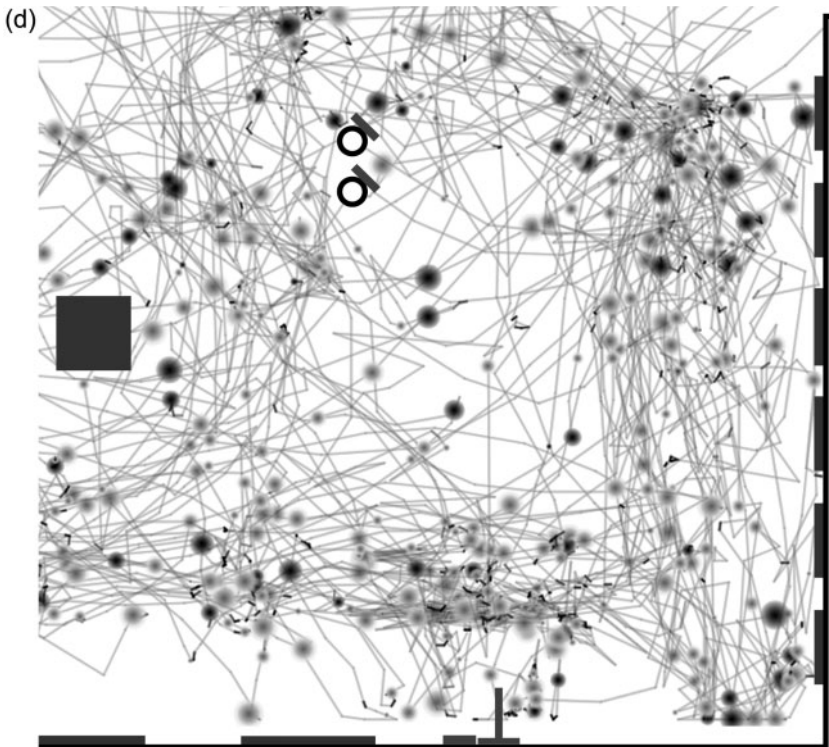
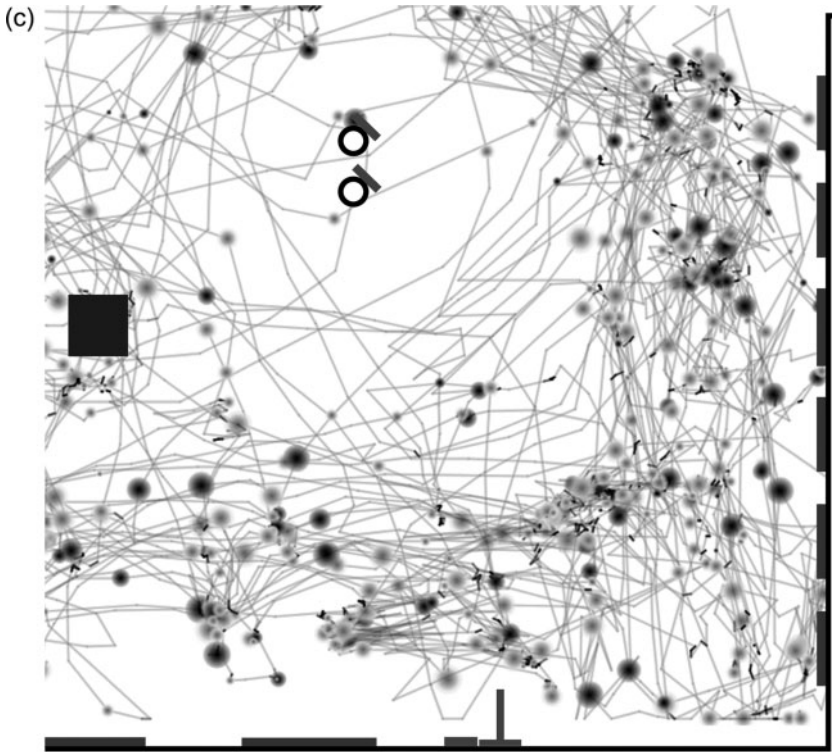


Figure 15. *Continued*

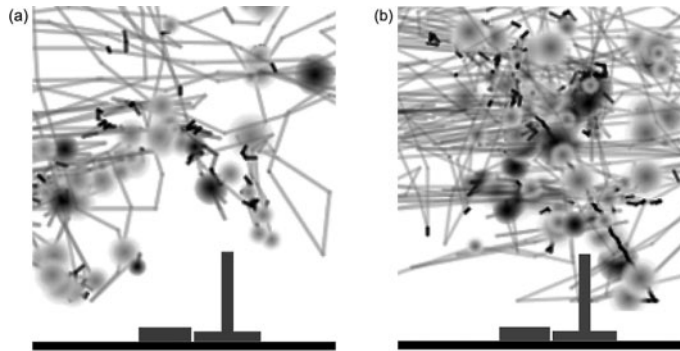


Figure 16. (a) Situation 0 (with sculpture): visitor reaction in front of the information text ‘T’ 106 and (b) Situation 1 (without sculpture): visitor reaction in front of the information text ‘T’ 106.

### **Artworks, curatorial arrangements, spatial structures, and beholders**

Without repeating the individual conclusions that were presented in this manuscript, several aspects of these experiments are important.

- (1) Firstly, viewing an artwork is strongly dependent on the environment in which it is positioned. It is only after a visitor has entered the actual exhibition space that the senses become engaged in a different way.
- (2) Secondly, the existence of an ‘esthetic mode of viewing’ has become evident, and, to our knowledge, this has been shown here empirically for the first time.
- (3) Thirdly, hanging order can exert considerable influence on the distribution of visitor attention, as demonstrated in our experiments. The artwork’s attraction power derives more from the curatorial arrangement in which it is embedded than from any intrinsic property of the artwork itself.
- (4) Fourthly, highly complex networks of effects and force fields (via curatorial groupings, specific text–image arrangements, etc.) are formed within exhibitions; with every rearrangement, the composition and weighting of the space considerably redirected visitor attention.
- (5) The experiments revealed that the spatial structure and interferences between artworks have a strong impact on visitor behavior and attention. Likewise, the way in which artworks are curated has a strong effect upon the visitor – but often this effect is an unintended one.

### **Limitations and future directions**

In this study, we deployed a multimethod approach by firstly gathering exact position and time data of the museum visitors; secondly, collecting physiological data of the museum visitors; thirdly, validating the quantitative physiological data by the individualized, qualitative exit survey; and fourthly, conducting various experiments in hindsight to our questions. The collected data was then amalgamated in mappings, in order to visually analyze the effects of the curatorial hangings. This complex methodology brings forward effects of curatorial arrangements, which could not be analyzed beforehand. Nevertheless, we have to emphasize that other methods, e.g. observations or video recordings to

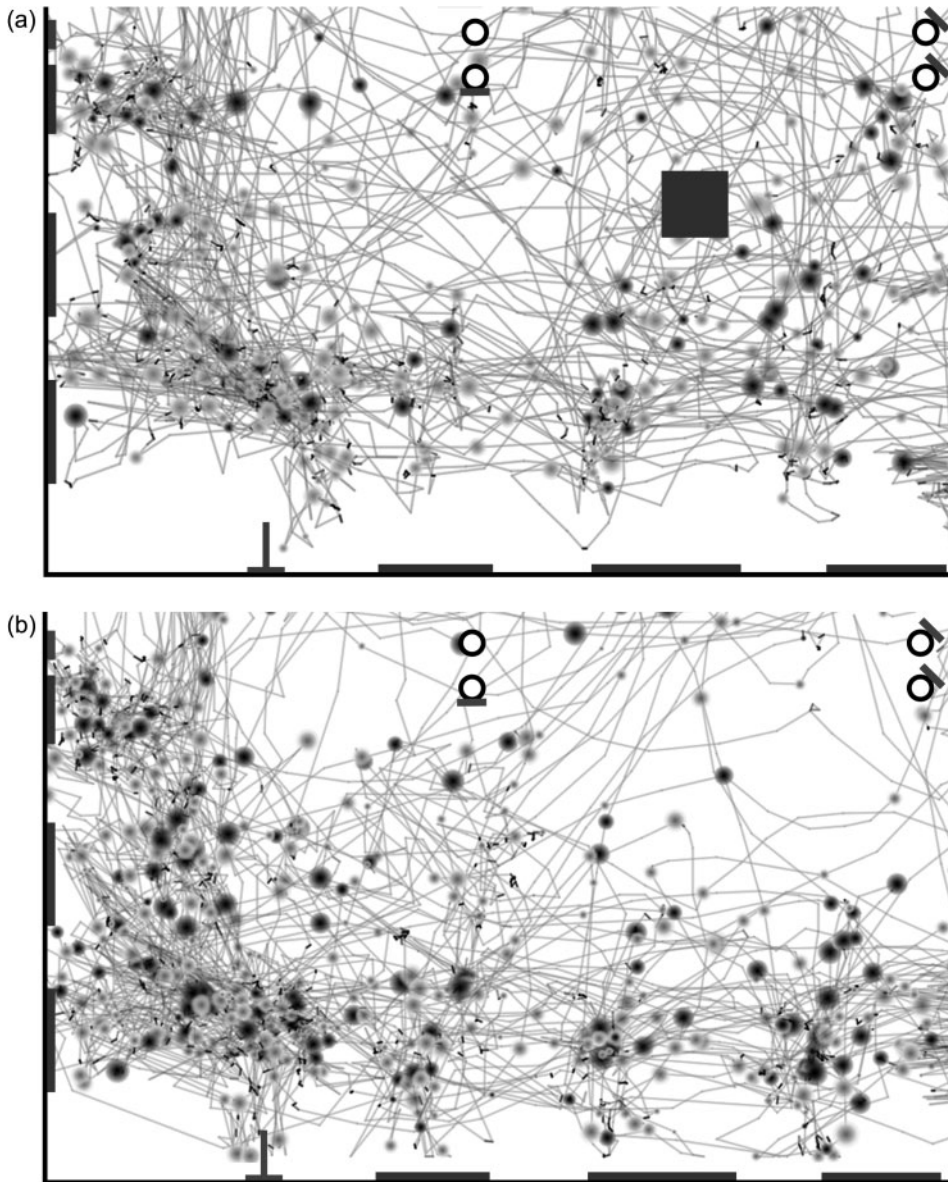


Figure 17. (a) Situation 0: Space 5 with sculpture. The artwork *Yellow Form* (Place ID 33) was positioned on the right-hand side of the information text 'T' 107 and (b) Situation 1: without sculpture.

analyze social interaction in the museum space, as well as in-depth interviews, would be additionally valuable to understand the meaningful aspect of curatorial arrangements better. If we have the chance to conduct our study once more, we would like to include more qualitative methods, but also eye tracking (such as SMI glasses, [www.smivision.com](http://www.smivision.com)). This enforced triangulation could further enhance the integration of quantitative, qualitative, and experimental methods in museum research.



It is obvious that the results presented here – obtained via the measurement of visitor paths and physiological effects – do not reveal the thoughts or reflections of visitors; however, they afford insights into the configurations of force fields in the exhibition and the resulting distribution of visitor attention in networks composed of actor/object interactions. Our methodological approach reveals how this network affects visitor attention.

One might critique the small sample size of 30 visitors, which has been used for each mapping. We experimented with various sample sizes and found 30 an ideal amount to map, in order to reveal behavioral aspects, while not presenting an overwhelming amount of visual data (see Tröndle et al. 2011). We have also shown that samples with varying sets of 30 visitors in the same situation yield the same result, e.g. when comparing Figures 2 and 5. Statistically speaking, the differences in the visitors' groupings become averaged out. Although this 'averaging-out' raises the validity of our study, it should nonetheless be emphasized that these results are the outcome of a pilot study in a fine arts museum in Switzerland, and perhaps, the study would have produced different results in another country. Given the similar curatorial approaches of installing artworks and texts across many fine arts museums, the results may be generalizable to some degree.

We are also well aware that field studies cannot be controlled in the same way as laboratory experiments can, however, extracting artworks from their 'natural environment' to test them in a lab setting creates its own type of extreme influence on reception, since artworks lose contextuality. We chose a field study contrary to a controlled laboratory study, in order to work in a real environment, with real artworks and real visitors (and not students rating artworks on computer screens as it is done in laboratory studies).

Some may suggest that certain results could have been foreseen and ask if the collection of empirical data was worth the effort. For the research team as well as for the curators of the museum, it was not foreseeable how strongly the various experiments would influence art reception and visitor behavior. Additionally, this is the first time for these effects to be empirically demonstrated, through our particular methodology and technical setup. We therefore think the results are of interest for researchers and practitioners addressing questions pertaining to museum management, visitor studies, and curation.

### **Acknowledgments**

This work was supported by the Swiss National Science Foundation (13DPD3-120799/1). We thank the Institute for Research in Design and Art at the University of Applied Sciences of Northwestern Switzerland (FHNW) for their support and Ubisense for providing the position-tracking technology.

We would especially like to thank the *eMotion* team: the psychologist Wolfgang Tschacher and the sociologist Volker Kirchberg; Sukandar Kartadinata and Christophe Vaillant for developing the electronic glove; Patricia Reed and Mauritius Seeger for the information design and programming; Roman Rammelt for the database management; and Nicolai Karl for managing the tracking technology. We also thank Johanna Schindler for proofreading. We also thank the reviewers for their detailed and fruitful comments.

### **Notes**

1. [www.kunstmuseumsg.ch/pressebilder/index.php?anlass=elfsammlungen\\_bida](http://www.kunstmuseumsg.ch/pressebilder/index.php?anlass=elfsammlungen_bida)
2. Every experimental setting was conducted until a hundred visitors had participated in that specific setting. As the visitors did randomly enter the museum, and as all of them were asked to participate in the research project, the visitors who chose to participate constituted the group of

the participants for one experimental setting. For the mappings analyzed here, we always chose the data of the last 30 visitors of each group. If two mappings of one situation were made, the data of the following 30 participants of this group was mapped.

### Notes on contributors

Martin Tröndle is Professor for Arts Management and Art Research at Zeppelin University, Friedrichshafen (Germany) and he is the principal investigator of *eMotion*. [www.kunstpartner.com](http://www.kunstpartner.com).

Steven Greenwood is a media artist based in Berlin. He was responsible for the technical coordination and the artistic development of the *eMotion* project. [www.telesthetic.org](http://www.telesthetic.org)

Konrad Bitterli is senior lecturer for curatorial practice at Zeppelin University, Friedrichshafen, and the chief curator at the Kunstmuseum St. Gallen.

Karen van den Berg is Professor for Art Theory and Curating at the Zeppelin University, Friedrichshafen (Germany).

### References

- Bailey, E. K., J. K. Bronnenkant, and G. E. Hein. 1998. "Visitor Behavior at a Constructivist Exhibition: Evaluating Investigate! at Boston's Museum of Science." In *Évaluation et éducation muséale. Nouvelles tendances*, edited by C. Dufresne-Tassé, 149–168. Montreal: ICOM/CECA.
- Bennett, T. 2005. *The Birth of the Museum: History, Theory, Politics*. London: Routledge.
- Carbonell, B. M. 2007. *Museums Studies. An Anthology of Contexts*. 6th ed. Malden: Blackwell.
- Gilman, B. I. 1923. *Museum Ideals of Purpose and Method*. Cambridge, MA: Harvard University Press.
- Groys, B. 1997. *Logik der Sammlung*. München: Hanser.
- Hooper-Greenhill, E. 2006. "Studying Visitors." In *A Companion to Museums Studies*, edited by S. Macdonald, 362–376. Malden: Blackwell.
- Hooper-Greenhill, E. 2007. "Changing Values in the Art Museum: Rethinking Communication and Learning." In *Museums Studies. An Anthology of Contexts*. 6th ed, edited by Bettina M. Carbonell, 556–575. Malden: Blackwell.
- Imamoğlu, Ç., and A. C. Yılmazsoy. 2009. "Gender and Locality-Related Differences in Circulation Behavior in a Museum Setting." *Museum Management and Curatorship* 24: 123–138. doi:[10.1080/09647770902857539](https://doi.org/10.1080/09647770902857539).
- Karp, I., and S. D. Lavine. 1991. *Exhibiting Cultures: The Poetics and the Politics of Museum Display*. Washington, DC: Smithsonian.
- Kirchberg, V., and M. Tröndle. 2012. "Experiencing Exhibitions: A Review of Studies on Visitor Experiences in Museums." *Curator – The Museum Journal*, 55 (4): 435–452. doi:[10.1111/j.2151-6952.2012.00167.x](https://doi.org/10.1111/j.2151-6952.2012.00167.x).
- Klein, H.-J. 1993. "Tracking Visitor Circulation in Museum Settings." *Environment and Behavior* 25 (6): 782–800. doi:[10.1177/0013916593256007](https://doi.org/10.1177/0013916593256007).
- Klüser, B., and K. Hegewisch. 1991. *Die Kunst der Ausstellung. Eine Dokumentation dreissig exemplarischer Kunstausstellungen dieses Jahrhunderts*. Frankfurt am Main: Insel.
- Latour, B. 1999. *Pandora's Hope, Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press.
- Latour, B. 2000. *Die Hoffnung der Pandora. Untersuchungen zur Wirklichkeit der Wissenschaft*. Frankfurt am Main: Suhrkamp.
- Macdonald, S. 2006. *A Companion to Museum Studies*. Malden: Blackwell.
- McCellan, A. 2008. *The Art Museum from Boullée to Bilbao*. Berkley: University of California Press.
- Melton, A. W. 1933. "Some Behavior Characteristics of Museums Visitors." *Psychological Bulletin* 30 (9): 720–721.
- Robinson, E. S. 1928. *The Behaviour of the Museum Visitor*. Washington, DC: American Association of Museums.
- Schubert, K. 2000. *The Curator's Egg. The Evolution of the Museum Concept from the French Revolution to the Present Day*. London: One-Off Press.

- Serota, N. ([1996] 2000). *Experience or Interpretation. The Dilemma of Museums of Modern Art*. London: Thames and Hudson.
- Serrell, B. 1998. *Paying Attention: Visitors and Museum Exhibitions*. Washington, DC: American Association of Museums.
- Staniszewski, M. A., and Museum of Modern Art (New York N.Y.). 2001. *The Power of Display: A History of Exhibition Installations at the Museum of Modern Art*. Cambridge: MIT Press.
- Tröndle, M., S. Greenwood, C. Ramakrishnan, W. Tschacher, V. Kirchberg, S. Wintzerith, K. van den Berg et al. 2011. "The Entanglement of Arts and Sciences: On the Transaction Costs of Transdisciplinary Research Settings." *Journal for Artistic Research* 1. Accessed <http://www.researchcatalogue.net/view/12219/12220>
- Tröndle, M., S. Greenwood, V. Kirchberg, and W. Tschacher. 2012b. "An Integrative and Comprehensive Methodology for Studying Aesthetic Experience in the Field: Merging Movement Tracking, Physiology and Psychological Data." *Environment and Behavior* 46: 102–135. doi:[10.1177/0013916512453839](https://doi.org/10.1177/0013916512453839).
- Tröndle, M., V. Kirchberg, and W. Tschacher. Forthcoming a. "Is This Art? An Experimental Study on Visitors' Judgment of Contemporary Art." *Cultural Sociology*. doi:[10.1177/1749975513507243](https://doi.org/10.1177/1749975513507243).
- Tröndle, M., V. Kirchberg, and W. Tschacher. Forthcoming b. "Subtle Differences: Men, Women and Their Art Reception." *Journal of Aesthetic Education*.
- Tröndle, M., and W. Tschacher. 2012. "The Physiology of Phenomenology: The Effects of Artworks." *Empirical Studies of the Arts* 30 (1): 79–117.
- Tröndle, M., S. Wintzerith, R. Wäspe, and W. Tschacher. 2012a. "A Museum for the 21st Century: The Influence of 'Sociality' on Art Reception in Museum Space." *Museum Management and Curatorship* 27 (5): 1–25.
- Tschacher, W., S. Greenwood, V. Kirchberg, S. Wintzerith, K. van den Berg, and M. Tröndle. 2012. "Physiological Correlates of Aesthetic Perception in a Museum." *Psychology of Aesthetics, Creativity, and the Arts* 6: 96–103. doi:[10.1037/a0023845](https://doi.org/10.1037/a0023845).
- Umiker-Sebeok, Z. 1994. "Behavior in a Museum: A Semio-Cognitive Approach to Museum Consumption Experiences." *Signifying Behavior. Journal of Research in Semiotics, Communication Theory, and Cognitive Science* 1: 52–100.
- Weil, S. E. 2002. *Making Museums Matter*. Washington, DC: Smithsonian.