ARTICLE

The Museum Experience: Mapping the Experience of Fine Art

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Abstract How do visitors to fine art museums experience exhibitions? Can we classify their experiences? What are the factors that drive different types of visitor experience? We set out to answer these questions by analyzing from sociological, psychological, physiological, and behavioral perspectives the responses of 576 visitors to a special exhibition *11: 1 (+ 3) = Eleven Collections for One Museum* mounted at the Kunstmuseum St. Gallen, Switzerland, from June to August 2009. Our five-year research project, eMotion: Mapping the Museum Experience, interpreted computer-modeled movement-tracking and physiological maps of the visitors in complement with entrance and exit surveys. We tested individual aspects of the visitor, such as her or his expectations of the exhibition prior to seeing it; his or her socio-demographic characteristics; her or his affinity for art, mood just before and receptivity just after the visit; and spatial, individual, and group-related behavior patterns. Our study breaks down three types of exhibition experience that we call "the contemplative," "the enthusing," and "the social experience." The results yield new information about aesthetic arousal, cognitive reaction, patterns of social behavior, and the diverse elements of the exhibition experience.

Anticipation of an experience is what brings most of us through the doors of a fine-arts museum. This might be the atmosphere of the space, the silence, a specific show, encounter with famous artworks, a good time with a companion, or just distraction. Though one would assume that the experiencing of a fine-art museum would be a concern of every institution, the issue is largely absent from the research in museum studies, as we discovered to our astonishment in a review of the literature for *Curator* (Kirchberg and Tröndle 2012). Instead, museum studies tend to deal with cultural, historical, or critical analyses of the museum as an institution: its role in society; its politics; its administration; its function as a place for learning, leisure, and self-actualization; its curatorial and collecting practices. Our challenge was to conduct a novel experiment, eMotion: Mapping the Museum Experience, to calibrate the nuanced encounters—physiological, social, psychological, aesthetic—of nearly 600 diverse persons with a specially designed exhibition of classic modern and contemporary art.

The highly influential "contextual model of learning" in museums developed by Falk and Dierking (2000) stresses four contexts: the personal, the sociocultural, the physical, and the flow of time (see also, Kirchberg and Tröndle 2012). Pekarik, Doering, and Karns (1999) emphasize the mutuality of expectations, experiences, and satisfactions of the museum visit. One of their major contributions is to structure the exhibition experience in four dimensions: the object experience (seeing rare, genuine, or valuable art, or being moved by beauty); the cognitive experience (gaining or enriching understanding of the art); the introspective experience (imagining, reflecting on, or connecting with the art); and the social experience

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(interacting with companions, strangers at the exhibition, or museum personnel). De Rojas and Camarero (2006) assert that the substantive qualities of the exhibition, the emotional "charisma" of the exhibition, and the "mood" of the visitor generate the satisfaction level of the visit. For them, the level of satisfaction in a museum visit is the difference between experience and expectation. Packer (2008) and Packer and Bond (2010) also describe a satisfying museum visit as a product of psychological well-being. According to Packer (2008, 37), the degree of a pleasurable museum visit depends on satisfying object, cognitive, introspective, and social experiences plus what she labels "restorative elements," such as fascination and being away from everyday life. Mihaly Csikszentmihalyi (1990) applied his "flow experience" model to aesthetic encounters in museums. Flow may be defined in its figurative sense of being "in the flow," totally immersed in the moment of doing something. He discusses the aesthetic encounter as perceptual (caused by specific features of a work of art), emotional (the evocation of delight, inspiration), intellectual or cognitive, and dialogic (a visual, emotional, and intellectual exchange with the artwork).

Each of these studies posits a general idea of chronology and causality. The visitor has a pre-visit condition; this condition is influenced by the museum visit; the result of the museum visit can be specified by a comparison of pre- and post-visit states. Most of the existing studies on museum experience propose that social, personal, or physical characteristics (pre-visit parameters) influence the visit experience (satisfying, confirming, or aesthetic). Most also conceptualize the museum experience as an input-output model. Input represents what the visitor comes with, such as expectations or knowledge of art, or takes in, such as the physical setting and the form and content of the exhibition. Output from the visitor concerns the grade of changes that occurred in the experience, such as where he or she looked, assessments of engagement and learning, and emotional and cognitive responses. We ask if there are other considerations of the experience of exhibitions, maybe less utilitarian, maybe less bound to strict disciplinary explanations. Do pre-visit parameters indeed influence the visit experiences so strongly and are they causally determined? And is the input-output model really appropriate to describe the museum experience? The presentation of our empirical data is guided by these questions.

Most studies about museum experiences were conducted in a range of museums—from natural history, science, and technology museums to crafts galleries, cultural heritage, and art museums to zoos. Some include manifold types of museums; others concentrate on one (see Kirchberg and Tröndle 2012). We considered that the expectations and experiences of exhibitions might differ considerably because of the orientations of the institutions presenting them. Another difficulty in comparing results of causes and contours of exhibition experiences is that the visitors who participated in these studies differed not only in their numbers but also in their individual backgrounds. Complicating matters further for us, a variety of research methods was used, from qualitative interviews to standardized questionnaires. Respecting these studies as milestones in revealing visitor experience, we also have had to keep in mind that direct comparison of those results to our study might not be possible. Nonetheless, the past studies help us as points of reference and guidance in developing a perhaps more holistic perspective on experiencing exhibitions. We assembled a team of scientists from the fields of sociology, psychology, art theory, and cultural studies; technicians and programmers; as well as practitioners from the

Figure 1. Exhibition Space 2 with paintings by Ferdinand Hodler (left) and Max Liebermann (right) looking into Space 3. *Photo by Stefan Rohner, courtesy Kunstmuseum St. Gallen.*

Kunstmuseum St. Gallen, Switzerland, where our experiment exhibition *11: 1 (+ 3) = Eleven Collections for One Museum* was held. Our five-year eMotion project endeavors to get at the heart of the art-museum experience using an integrated methodology combining entrance and exit surveys with digital tracking of movements through the galleries and continuous measurement of the visitors' physiological reactions to the event.

SET-UP OF THE eMOTION FIELD STUDY

The Research Site, St. Gallen Fine Arts Museum

Between June and August 2009, 576 randomly selected visitors to the fine-arts museum of St. Gallen participated in the eMotion project. The aim of the study was to investigate the museum experience and to analyze how art objects and their installation affect visitor behavior (www.mapping-museum-experience.com/en). The exhibition *11: 1 (+ 3) = Eleven Collections for One Museum* was curated by Roland Wäspe and Konrad Bitterli for this field research. It consisted of seventy-six works from the museum's collection and fourteen didactic panels giving detailed biographies of donors of art who had expanded the collection of the St. Gallen Kunstmuseum. The exhibition was a virtual tour through art history from impressionism to contemporary art, using drawings, paintings, and sculptures. The exhibition was laid out in seven galleries, with the ticket counters and the entrance-survey booth in the museum foyer

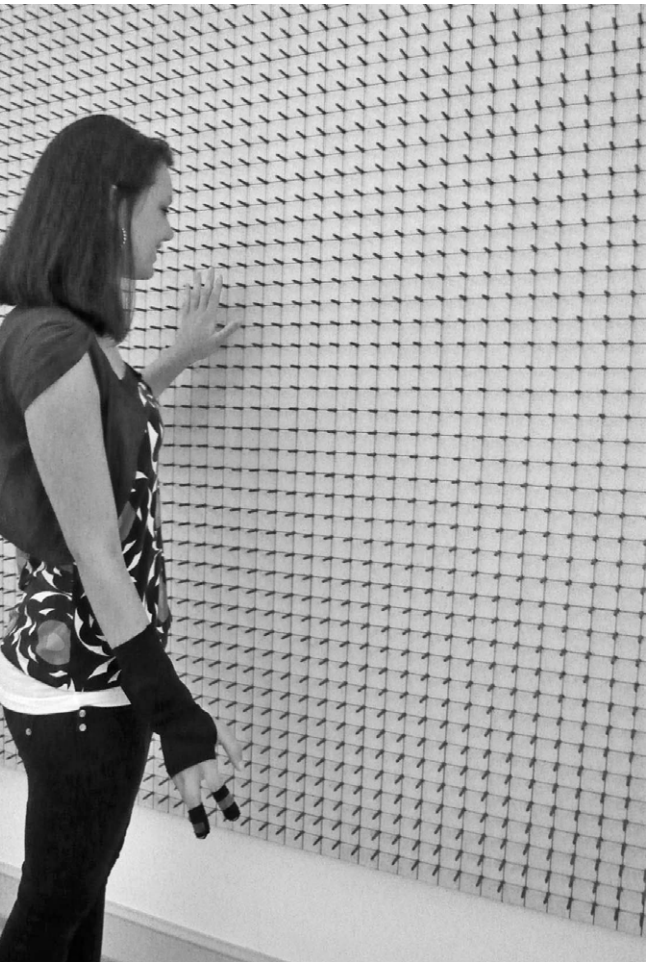

Figure 2. eMotion participant wearing the data glove in front of *Antibild, Räumliche Struktur, Aggressive Reihung* by Günther Uecker. *Photo by Stefan Rohner, courtesy eMotion.*

(project Space 1) and the exit-survey booth in an exit room (Space 9) (Figure 1).[1]

An important distinction between the eMotion project and previous studies on art perception was the decision to use original art. Most other research relies on facsimiles, which cannot provide accurate assessments of physical interactions with "the real thing" (Tröndle and Tschacher 2012). The eMotion data show that participants displayed physiological responses as soon as they entered the first gallery.

Methods: Procedure and Participants

Visitors who chose to participate in the project were fitted on the right hand with a data glove in Space 1 in the museum foyer before starting their tours of the exhibition (Figure 2). The glove contained various measuring devices transmitting to wireless receivers in all Spaces that continuously recorded the visitor's exact path and the time spent in front of an object, label, or didactic text, as well as the velocity with which the visitor moved. In addition, two physiological responses were taken: heart rate (HR) and skin conductance level (SCL), along with their respective variabilities, HRV and SCV. Each participant's position was tracked per second; up to five participants were identified simultaneously with a precision of 15 cm. The entrance survey provided in Space 1 consisted of the standard socio-demographic inquiries and questions about visitation motivation, attitudes towards and expectations of art exhibitions, and the visitor's knowledge of art. The exit survey provided in Space 9 consisted of questions concerning the completed visit that have to do with behavior while visiting the exhibition, the exhibition experience, and the assessments of the artworks, which evoked significant reactions (according to the physiological tracking device). The exit survey framed the questions of the entrance survey in slightly different manners to allow for a comparison of pre-visit expectations and post-visit experiences. Each visitor received an individual "subject ID" through which all the collected data could be registered on a server anonymously and merged into a single data set for each participant.

Single visitors and visitor groups of up to six people were invited to participate. Guided tours were not included because they prevent visitors from moving freely on their own. Individuals in groups larger than six technically could not be monitored simultaneously. Visitors also had to be 18 years or older, fluent in either German or English, and could take part in the project only once. A few visitors declined participation, mostly due to lack of time or interest. The 576 participants account for approximately half the total of all visitors to the two-month exhibition. The sample can be considered representative of the museum-visitor norms regarding number of visitors, gender, residence, company, and annual frequency of art-museum visits (for more detailed socio-demographic data, see Tröndle, Kirchberg, and Tschacher 2012).

Given the relatively long questionnaires and the technical set-up, we also tested the reliability of our study—the potential intervening effect of the data glove, for one—via a control group (n = 24). The two groups without (n = 24) and with (n = 552) the glove were compared by variance analyses in order to determine whether the visitors without a glove responded differently. Were they, for example, biased in their answers? Our conclusion is that the influence of the glove on the survey responses had small to minimal effect, both as measured in the control group and as measured by the respective items.

CONSTRUCTS OF EXHIBITION EXPECTATIONS AND EXPERIENCES

The dependent variables of the study are the exhibition experiences of the surveyed visitors. Experiences were explained by a set of independent variables that were statistically linked to them by variance and regression analyses. These independent variables are especially anticipated exhibition expectations, biographical characteristics (socio-demographic characteristics and levels of art knowledge among the respondents), and individual mood levels (the emotional condition when entering the museum). Indicators for these expectations were twelve statements the visitors had to evaluate on a five-point Likert scale (Table 1):

> The question about *expectations* was: What are you expecting from an art exhibition? Please rate the following statements according to the scale 1= absolutely unimportant to me, 2 = rather unimportant, 3 = neutral, 4 = rather important, 5 = very important to me.
>
> The question about the *experience* was: In this exhibition, which of the following statements fits best your own experience? Please rate according to the scale 1= strongly disagree, 2 = don't really agree, 3 = partly agree, 4 = agree, 5 = absolutely agree.

The terms used for exhibition expectations and exhibition experiences were the same that Pekarik, Doering, and Karns (1999) applied in the Smithsonian Institution (SI) surveys.[2]

A first look at the participants' entrance- and exit-survey answers shows that their pre-visit expectation statements and their post-visit experience statements do not match. Of the twelve possible pre-visit expectations, three exhibition characteristics were anticipated the most: surprise, sensitization, and reflection. However, these are not the characteristics with the highest post-visit experience ratings: fame, familiarity, and silence. Almost all measured exhibition aspects were ranked higher in expectation than in experience (for a complete list of means, see Digital Appendix Table 1; appendices are published in the electronic version of this essay available at http://www.curatorjournal.org/).

Table 1.
Statements in the survey measuring twelve elements of exhibition expectations and exhibition experiences

Item	Anticipated expectation I would like . . .	Undergone experience I . . .
Reflection	the exhibition to be thought-provoking	was provoked to think by this exhibition
Design	the exhibition design to be convincing	was convinced by the exhibition design
Silence	to enjoy the silence of this place	enjoyed the silence of this place
Art appreciation	the exhibition to improve my understanding of the fine arts	improved my understanding of the fine arts through this exhibition
Companionship	to have a nice time with my companion(s)	had a nice time with my companion(s)
Sensitization	to immerse myself in the exhibition with all my senses	immersed myself in the exhibition with all my senses
Art connectedness	to build a deep connection to the exhibited art	built a deep connection to the exhibited art
Familiarity	to come upon something that I am familiar with, that I know	came upon something that I am familiar with, that I knew
Beauty	to let the beauty of the artworks sink in	let the beauty of the artworks sink in
Entertainment	to be entertained well	was well entertained
Surprise	to be surprised by new impressions	was surprised by new impressions
Fame	to see famous artworks	saw famous artworks

Three Types of Exhibition Experience

Due to the similarities of the measured twelve exhibition-experience items in the answers of the respondents, we aggregated them into three *types of experience* by principal component analysis with a varimax rotation.[3] We apply varimax rotation to maximize the sum of the variances of the squared loadings (the squared correlations between variables and factors) and, thus, to avoid high interdependencies among the resulting factor scores (see Kaiser 1958) that will be used for subsequent causal analyses in the following step.

The reduction of complexity by factor analysis is a common procedure in quantitative statistical analysis to uncover the hidden structures behind a plenitude of answers. We found three dimensions (principal components or factors) of museum experience using our data from the St. Gallen art museum survey.

Derived from the factor loadings of the twelve measured experience items to the three factor dimensions in Table 2, we label our three experience dimensions the "*contemplative* experience," "*enthusing* experience," and "*social* experience" of the museum visit. In Table 3 we describe these three types of museum experience according to the items that load highly to these factors. Factor scores for these three types of experience are saved for the following regression analyses of variables that impact these three types of experiences. Three distinct experience factor scores are assigned to each eligible respondent; they have thus an individual degree of contemplative, enthusing, or social experience.[4]

The central question of our research is, *How much do specific factors explain the exhibition experience as contemplative, enthusing, or social?* These factors are (1) pre-visit expectations towards the exhibition; (2) socio-demographic characteristics; (3) personal relatedness to art; (4) the visitor's mood prior to the museum visit; (5) the post-visit assessment of exhibition aspects; and (6) potential social group dynamics (Table 4).[5] These six constructs were translated into survey questions, as shown in column 3 of Table 4. The dependent variables of the

Table 2.
Factor matrix (significant factor loadings) of dimensions (factors) and experience items, according to the visitors' assessments of twelve *experience* items

Experience item	Statements (assessed on a 5-point scale) The exhibition ...	Factor loadings 1	2	3
Sensitivity	opened and alerted my senses	.695		
Art Connectedness	gave me a connection to the arts	.684	.282	−.213
Reflection	was thought-provoking	.678		
Art Appreciation	improved my understanding of art	.665	.212	
Design	design was convincing to me	.664		
Surprise	surprised me	.658		.212
Entertainment	was entertaining	.553	.225	.466
Silence	made me enjoy the silence	.462		−.383
Familiarity	let me experience familiar art		.837	
Fame	let me experience famous art		.759	
Beauty	let me experience beauty	.490	.553	
Companionship	gave me time with family/ friends			.818

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Only factor loadings >.20 are displayed.

following multiple linear-regression analyses are the factor scores for each of the three experience types.

Pekarik, Doering, and Karns (1999) assume that expectations might affect the assessments of exhibition experiences. We demonstrate in our Table 1 that we asked the same survey questions for expectations before the visit and for experiences after the visit. Corresponding to the procedure for the dependent experience variables, we also reduced the number of expectation variables by applying factor analysis (varimax rotation) and gained three *expectation dimensions* that are very similar to the experience dimensions (see factor loadings > ±.20 in Digital Appendix Table 2).

The first expectation type (16.8% explained variance of the squared loadings) combines the expectations of a contemplative museum experience: the visitor's sensual engagement with the exhibition, the wish to reflect and think about the exhibited material, to make a deep connection to the art, to understand and thus appreciate the art, to be surprised by new experiences, and to be impressed by the exhibition design. The second expectation type (14.6% explained variance) merges the expectations of an enthusing experience: the encounter with familiar and famous art, and with beauty and silence—more introspective connotations. The third expectation type (11.0% explained variance) anticipates a social experience: companionship, entertainment, and, again, surprise, but not a deep connection to the exhibited art.

Every respondent achieved distinct expectation scores for his or her contemplative, enthusing, and social expectations of the exhibition.[6] Three linear-regression analyses were applied, calculating the above-mentioned experience-factor scores as dependent variables and the here-mentioned three expectation-factor scores as independent variables, each entered at the same time. According to our analysis expressed in Digital Appendix Table 3, none of the expectation dimensions impacts the experiential dimensions of the project exhibition.

Socio-demographic characteristics. Our research discloses that none of the socio-demographic variables we tested affects any of the exhibition experiences—only that the 351 female visitors out of the 570 participants (six of the total 576 did not list a sex) enjoyed a social experience slightly more often than the 219 male visitors (see regression coefficients of Digital Appendix Table 4). The 61.6% female majority versus the 38.4% of male visitors is consistent with other measures of art-museum visitorship. We again deployed linear regression analysis to calculate the impact of socio-demographic variables, such as age (ratio scale data), gender, and Swiss residence, as shown in Digital Table 4.

Occupation, however, does affect the three types of art-museum experience. Teachers (this category includes university lecturers and professors) have a more than fourfold-higher probability (exp (B) = 4.159, Digital Appendix Table 5b) to belong to the contemplative experience type than to the social-experience type. Students (this includes pupils and apprentices) have an almost threefold-higher probability (exp (B) = 2.89, Digital Appendix Table 5b) of belonging to the enthusing-experience type than to the social-experience type. We analyzed "occupation" as a nominal scale variable by multi-nominal logistic regression analysis. For comparative purposes, we also transformed the other socio-demographic variables and the experience scores into grouped categories to test their potential impact, again. From the test results, the variable "occupation"—and only this variable—has a significant effect on the attribution to an exhibition type (Digital Appendix Table 5a).

Personal relatedness to art. Only one variable of art-relatedness is slightly associated with experience: art knowledge positively impacts (but just below the 5% probability threshold; sig. = .047) the enthusing experience of the exhibition; the higher the visitor's art knowledge, the slightly higher is the score for this type of experience (see linear regression coefficients of Digital Appendix Table 6). We arrived at this conclusion through survey questions using four variables. To determine the importance of the exhibited art in this exhibition as reason to visit we requested Likert-scale answers to "What was the main and second reason for your visit here today?" To calculate knowledge of art we devised a quiz for the entry survey:

> How well do you know the following artists, artworks, and styles? Please rate your knowledge according to the scale 1 = I know them well; 2 = I've heard about them; and 3 = I don't know them.
>
> 1. Taeuber-Arp
> 2. Futurism
> 3. Pitlinsky*
> 4. *Campbell's Condensed Tomato Soup* (A. Warhol)
> 5. Minimal art
> 6. *Eléments mécaniques* (F. Léger)
>
> *Pitlinsky is not a known artist; the name was used in the quiz to judge the truthfulness of a participant's reply.

We gauged interest in fine arts by a scale from 1 = I don't care much about fine arts (7%); 2 = I am rather interested but not an expert (51%); 3 = I am very much interested in art (10%), and 4 = I am professionally working with art (32%). The fourth variable was the annual frequency of visits to art museums. 19.4% of the participants answered that they only visit fine-art museums once or twice a year. 23.2% stated that they visit fine-art museums three to

Table 3.
Dimensions of exhibition experience, St. Gallen Kunstmuseum visitor survey

Dimension of experience	Description of experience dimension
Contemplative experience	The *contemplative museum experience* corresponds with a high degree of sentience and sensitivity to the exhibits. Visitors are alert and open to the arts and their beauty and wish to be surprised and entertained by this experience. S/he connects deeply, reflects and thinks about, as well as improves her/his understanding of the exhibited arts, and agrees with the design of the exhibited art and the exhibition.
Enthusing experience	The *enthusing museum experience* corresponds with the familiarity, i.e., the recognition of famous art already experienced and known before. Here, fame and beauty go hand in hand; fame might be a criterion for assessing a work of art as beautiful.
Social experience	The *social museum experience* corresponds very highly with the experience of companionship, with the togetherness of family or friends and correspondent entertaining situations, not with introspective silence or a deep connection with the exhibited art itself.

four times a year. Those visiting art museums six to fifteen times annually constituted 21.5%. The largest number of respondents, 35.9%, stated they visit art museums more than sixteen times a year.

Mood. In the entrance survey, we asked the participants about their states of mind, "to give us a hint of how you are feeling here and now." We asked the visitor to rank her or his mood between the extremes of seven pairs of adjectives based on seven moods: "disinterested," "tired," "unfocused," "weak," "tense," "idle," and "angry." We compiled a "negative mood" index from the arithmetic means of these assessments and correlated it with the contemplative, enthusing, or social-experience factor scores.[7]

None of the regressions coefficients was significant. Our study found no link between pre-visit mood and experience of the exhibition (see regression coefficients of Digital Appendix Table 7).

Assessment of exhibition aspects. The individual's assessments of the exhibition's artworks and the exhibition's contexts strongly affect the exhibition experience. We asked the visitors to grade issues such as "choice of exhibited works," "installation of the art," "labeling," "information given about the artworks/didactic texts," "ambience of the galleries," "seating opportunities," and, finally, the "exhibition as a whole" on a Likert scale from 1 = poor to 5 = excellent.

The contemplative experience, as the regressions analyses show, is mostly and positively influenced by the visitor's overall assessment of the exhibition (sig. = .000), then the grading of the information provided (sig. = .027), as well as by the personal rating of the choice of exhibited works (sig. = .002). The contemplative-experience visitor rates the choice of exhibited works towards "excellent," information given about the artworks / didactic texts the next-best grade "good," and the seating arrangements between "fair" and "satisfactory."

The enthusing-experience visitor, like the contemplative type, is positively influenced by the personal rating of the choice of exhibited works (sig. = .000). The personal grading of the provided seating opportunities influences significantly and positively the social experience (sig.

Table 4.
Potential independent variables (factors) explaining the exhibition experience

Construct (composite)	Variable (factor)	Indicator (measurement by survey questions)
Expectations about the exhibition	Three expectation types: *contemplative* expectation *enthusing* expectation *social* expectation compiled (by PCA) from twelve expectation items, with three corresponding factor scores	Assignment to expectation type by factor scores, calculated from 5-point Likert-scale assessments of twelve expectation statements (see Table 1): What do you expect from this exhibition? Please rate the following statements according to the scale 1 = absolutely unimportant to me; 2 = rather unimportant; 3 = neutral; 4 = rather important; 5 = very important to me
Socio-demographic characteristics	Age	Your age
	Gender	Gender: female = 1 / male = 0
	Place of residence	Swiss residence = 1 / non-Swiss residence = 0
	Education	What is your level of education? (current or in progress): college degree = 1; no college degree = 0
Personal art-relatedness	Art as a reason to visit	What is the main reason for your visit here today? Answer measured by a 5-point Likert scale from 1 = art is not a reason to 5 = art is the main reason
	Art knowledge	How well do you know the following artists, artworks and styles? Recoded in a 5-point Likert scale from 1 = no knowledge to 5 = much knowledge
	Interest in fine arts	How deep is your interest in fine arts? 1 = I don't care much about fine arts 2 = I am rather interested but not an expert 3 = I am very much interested in fine art 4 = I am working with fine art
	Familiarity with art museums	Frequency of annual art-museum visits
Mood	Negative mood level	Arithmetic mean of assessment (5 point-Likert scale) of seven negative feelings: semantic differential measurements of disinterested, tired, unfocused, weak, tense, idle, angry
Exhibition aspects	Choice of artworks Arrangement of art works Labeling of art works Information about art works Ambience of exhibition halls Seating opportunities Exhibition as a whole	You have just seen the exhibition. How do you rate the following aspects of it? (5-point Likert-scale assessments of the exhibition aspects [to the left] from 1 = poor to 5 = excellent)
Group dynamics	Company	Did you come alone or with somebody else? with somebody else = 1 / alone = 0
	Talking about the art while visiting	Walking through the exhibition, did you discuss the artworks with anyone? yes = 1 / no = 0
	Subjective significance of company	Main or second reason for your visit here today. I visit because of the person(s) accompanying me. yes = 1; no = 0

(continued)

Table 4. Continued

Construct (composite)	Variable (factor)	Indicator (measurement by survey questions)
	Activity at the position of the exhibition where the visitor spent the longest time: two questions relating to communication with other people, two relating to the art, and two relating to introspection	Multiple responses (yes = 1; no = 0) to: I had a close look at one of the artworks I was discussing one of the artworks with somebody else I was talking to somebody, but not about the artworks I had a rest I was reading the labels or some didactic texts I was taking in the atmosphere of the room

= .015; see Digital Appendix Table 8 for all these regression coefficients and levels of significance).

The social-experience visitor rates the choice of exhibited works lower, between "satisfactory" and "good," but judged the seating opportunities much higher, between "satisfactory" and "good," than the contemplative-experience type.

Curators and exhibition designers should be conscious of the fact that there is no "one-size-fits-all" approach to accommodating the exhibition experience, borne out by the assessment criteria and research results.

Group dynamics. Falk and Dierking (2000) demonstrate that the social context affects the exhibition experience. In our exit survey, we asked the respondents what they were doing at the place in the exhibition where they stayed the longest. Two specific activities while visiting the exhibition were clearly communicative and directed towards other people in the room: "I was discussing one of the artworks with somebody else;" "I was talking to somebody, but not about the artworks." Two of them were self-involved, focusing on art, not people: "I had a close look at one of the artworks;" "I was reading the labels or some didactic texts." Two others were introspective and more related to one's personal focus, not to the artworks: "I had a rest;" "I was taking in the atmosphere of the room."

Of these group-related factors, "talking while visiting," in particular, significantly affected the exhibition experience (see regression coefficients of Digital Appendix Table 9). "Talking while visiting" decreases the contemplative experience (sig. =.045) but, as one might expect, increases the social experience (sig. = .000). 86% of visitors having mostly a social experience clicked on the questionnaire answer "talking while visiting," versus 44% of the visitors having a contemplative experience. By trend, people who visit in the company of others are less often members of the contemplative-experience type (Tröndle, Wintzerith, Wäspe, and Tschacher 2012).

Asking the visitor about his or her activity at the place in the exhibition at which the visitor paused the longest confirmed a distinct split in the museum experience: 24% of the contemplative type responded that he or she took in the atmosphere of the room; significantly fewer visitors of the social type (16%) gave that answer.

In sum, aspects of the exhibition itself, such as the visitor's assessment of the choice of works and the quality of provided information (in the case of the contemplative type) or the assessment of seating arrangements (in the case of the social type) had the greater impact on all three experience types, contemplative, enthusing, and social. Aspects of group dynamics,

such as talking while visiting or taking an introspective and close look at the art, had a secondary effect.

Further, except for the occupational affiliations teacher or student, no common sociodemographic variable (age and education are often mentioned as being positively related to a predilection for the fine arts) influenced exhibition experiences in our case study. All in all, our results confirm the statements of Falk and Dierking (2000) that there are close causal relationships between the physical context (alluding to the assessment of the exhibition itself, the choice of artworks; installation; labeling and didactics) and the scope of a contemplative experience and between the sociocultural context (alluding to group dynamics: talking while visiting; visiting for social reasons; seating opportunities) and the social experience.

To reiterate, our main finding up to this point in the research is the tripartite aspect of the exhibition experience—contemplative, enthusing, or social.

COGNITIVE AND EMOTIONAL ASSESSMENTS OF SELECTED ARTWORKS ON THE THREE EXPERIENCE TYPES

How intensely did recipients of a contemplative, an enthusing, or a social experience react to selected artworks in the exhibition *11: 1 (+ 3) = Eleven Collections for One Museum*?

We conducted a special analysis of the emotional and cognitive impacts these artworks have on the visitors using ten works as benchmarks: Monet's *Palazzo Contarini, Venice*, 1908; Hodler's *Linienherrlichkeit*, 1909 (the nude in Figure 1); Hodler's *Thuner See*, 1913; Arp's *Entre Lys et Défense*, 1958; Arp's *Schematisches Relief*, 1953; Thomas Virnich's *Treibriemen-Skulptur* 1989; Günther Uecker's *Antibild, Räumliche Struktur, Aggressive Reihung*, 1973 (see Figure 2); James Rosenquist's *Bild mit Glühlämpchen* (Picture with small lightbulb), 1962; and several of thirty-two small "spontaneous graffiti," drawn in conspicuous spots on the gallery walls comprising *A Label Level*, commissioned from Nedko Solakov for the 2009 exhibition (see Figure 5b). These ten works were selected because they represent the scope of periods, styles, media, and artists on view.

In the exit survey, the visitor was asked to assess her or his cognitive and emotional reactions to these works. Variables of emotional reactions have been constructed from the visitor's gradings of nine statements: "This artwork . . . pleased me, made me laugh, surprised me, made me think, moved me emotionally, frightened me, made me angry, made me happy, made me sad" (the grading used a Likert scale from 5 = absolutely agree to 1 = strongly disagree). Variables of the visitor's cognitive reactions were constructed from the visitor's gradings of these eight aspects of the artwork: content/topic, artistic technique, composition, beauty, the artist, its importance in art history, presentation of the artwork, and connection/correspondence to the other artworks of the exhibition (the grading used a Likert scale from 5 = excellent to 1 = poor). For each visitor, we then calculated nine emotional and eight cognitive index variables by averaging the personal assessments of all ten artworks (for further details, see Tröndle and Tschacher 2012). Subsequently, we conducted forward-method regression analyses, with the grading of the above emotional and cognitive variables as independent variables, and the contemplative, enthusing, and social experiences factor scores as dependent variables.

The statement "This artwork made me think" is highly and positively related to the contemplative experience (beta = +.327; sig. = .000, see Digital Appendix Table 10a). "This artwork

moved me" is significantly and positively related to the contemplative mode (beta = +.184; sig. = .03; see Digital Appendix Table 10b). A positive cognitive assessment that a selected work connected to other art in the exhibition is strongly related to the contemplative exhibition experience (beta = +.209; sig. = .000, model 2, Digital Appendix Table 10d) as is the cognitive appreciation of the presentation (beta = +.187, sig. = .001, model 2, Digital Appendix Table 10d). Deeply thinking about the art, being moved by it, assessing the interaction with the other exhibited works, and considering the specificities of presenting the selected artworks are all part of a contemplative experience of this exhibition.

For the enthusing type of visitor, his or her emotional reactions to the selected works are highly significant and positively related to this dimension of exhibition experience (beta = +.203; sig. = .001 for happiness; beta = +.167; sig. = .005 for sadness, model 2, Digital Appendix Table 10b). A strong approval of the emotional statement "This artwork moved me" is also significant for having an enthusing experience (beta = +.178; sig. = .014, model 3, Digital Appendix Table 10b). Only one cognitive assessment, beauty, is found to also affect the enthusing visitor significantly and positively (beta = +.155; sig. = .002, Digital Appendix Table 10e).

There is one emotional reaction to the selected artworks that impacts the social experience visitor: "This artwork made me laugh." The visitor who has this reaction is likely either to have laughed, together with company, about the exhibited art, or to have laughed at the art, in the sense of ridicule (beta = +.152; sig. = .012, Digital Appendix Table 10c). The determination of the social-experience type by cognitive reactions to the selected artwork reveals a counter-image to the contemplative-experience type. The assessment of the content of a work, for example, affects highly—but this time negatively—the social experience. In other words, the less the visitor takes into consideration the content of the artworks, the higher is his or her level of social experience (beta = -.163; sig. = .009, model 3, Digital Appendix Table 10f). The disregard for content by the social-experience type has a parallel disregard for art history (sig. = -.155, sig. = .020, model 3, Digital Appendix Table 10f).

Another cognitive reaction to the art chosen for the exit survey inflects the social experience positively: the high regard for the artist as creator of the artwork in question. This is not contradictory to the reactions of disregard or ridicule; rather, the social-type visitor is acknowledging and accepting the star system dominating the art world and the significance of fame and recognition, none of which should be mixed up with acknowledging and accepting content and art-historical issues (beta = +.222; sig. = .001, model 3, Digital Appendix Table 10f).

Twenty years ago, Antoine Hennion and Bruno Latour conceived of an art sociology (instead of a sociology of art) focused not just on the social construction of art (represented in models such as art worlds, art fields, art systems, or the socioeconomic biography of the beholder), but on artworks and exhibitions as inherent aspects unto themselves (Hennion and Latour 1993). In direct contact with things, writes Hennion, "moments and gestures of taste are either neglected or are directly denounced as rituals whose principal function is less to make amateurs 'feel,' than to make them 'believe'" (2007, 98). Our findings strongly support Hennion and Latour's proposition that the sensual encounter with art objects has great significance for the recipient.

Along with the significance of the exhibition-related features and the insignificance of the visitor's social background in relation to the

exhibition experience, the principal result of our analyses expressed above is our classification of the exhibition experience in three dimensions. This conclusion implies that the artworks and the mode of exhibiting them have a more powerful effect upon museum visitors than has been widely assumed. If we take this as true, we might formulate the hypothesis that being affected by a work of art, or even being affected by the museum visit in general, produces observable effects on the beholder that may be valuable indications of differing behavioral patterns or physiological states of the three experience types. To test this hypothesis we analyzed the spatial behavior and the physical reactions of the contemplative, enthusing, and social types of exhibition experience.

QUALITATIVE RESULTS OF THE VISITOR SURVEY: MOVEMENT TRACKING AND PHYSIOLOGICAL PHENOMENA

The position of each e-Motion participant through the exhibition spaces was tracked per second with a precision of 15 cm. By using this digital locomotion technology it is also possible to create various mappings (layering the data of several visitors) in one mapping. This we did for each of the three exhibition-experience types.

The physiological parameters we recorded were heart rate (HR) and skin conductance level (SCL), along with their variabilities, HRV and SCV. One might mention that from the outset of research into empirical aesthetics (Fechner 1876, Berlyne 1960, and overview in Allesch 2006) scholars have tried to show correlations between aesthetic experience and physiological reactions, such as fluctuations in heart rate or skin conductance. Until now, this did not work out. In the field, as opposed to laboratory study, one has to deal with manifold influences on the data from an uncontrolled environment. Our research team—technical experts, programmers, psychologists, art theorists, sociologists, museum staff—worked two years to surmount this problem, developing our own measurement device (the electronic glove) and complex algorithms to handle the data. Both approaches were only possible by utilizing the latest technology and high-speed computers (Tschacher and Tröndle 2012; Tröndle and Tschacher 2012; Tröndle et al. 2011, 2012).

Another critical note could be the influence of physical activity on the visitor's physiology. After sitting to answer the entrance survey, for instance, his or her rising from the chair and starting to walk would bias the physiological data. Figure 3 demonstrates the physiological reactions of thirty randomly chosen visitors in the activities of filling in the initial survey, walking through the entrance hall, standing still, and examining artworks. The thicker black lines indicate the perimeters of the ground-floor Spaces 1 (museum foyer) and 2 (first gallery) of the exhibition. After putting on the electronic glove on the right hand and conducting the entrance survey, the visitor crosses the entrance hall to enter Space 2 (shown in Figure 1), where the exhibition began.

The fine gray paths in Figure 3 indicate each visitor's velocity: the position of each participant was recorded once per second, and for each second a point was plotted and a line was drawn from point to point to make the map. The faster a visitor moved the longer and straighter the line points in one direction. In contrast, a short-line path replicates slower movement. If significant changes in the visitor's heart rate (heart rate variability, HRV) were detected, a light gray blurry circle attached to the participant's path. Dark gray markers represent the fluctuations in skin conductance (SCV); the stronger the fluctuations, the larger the markers.

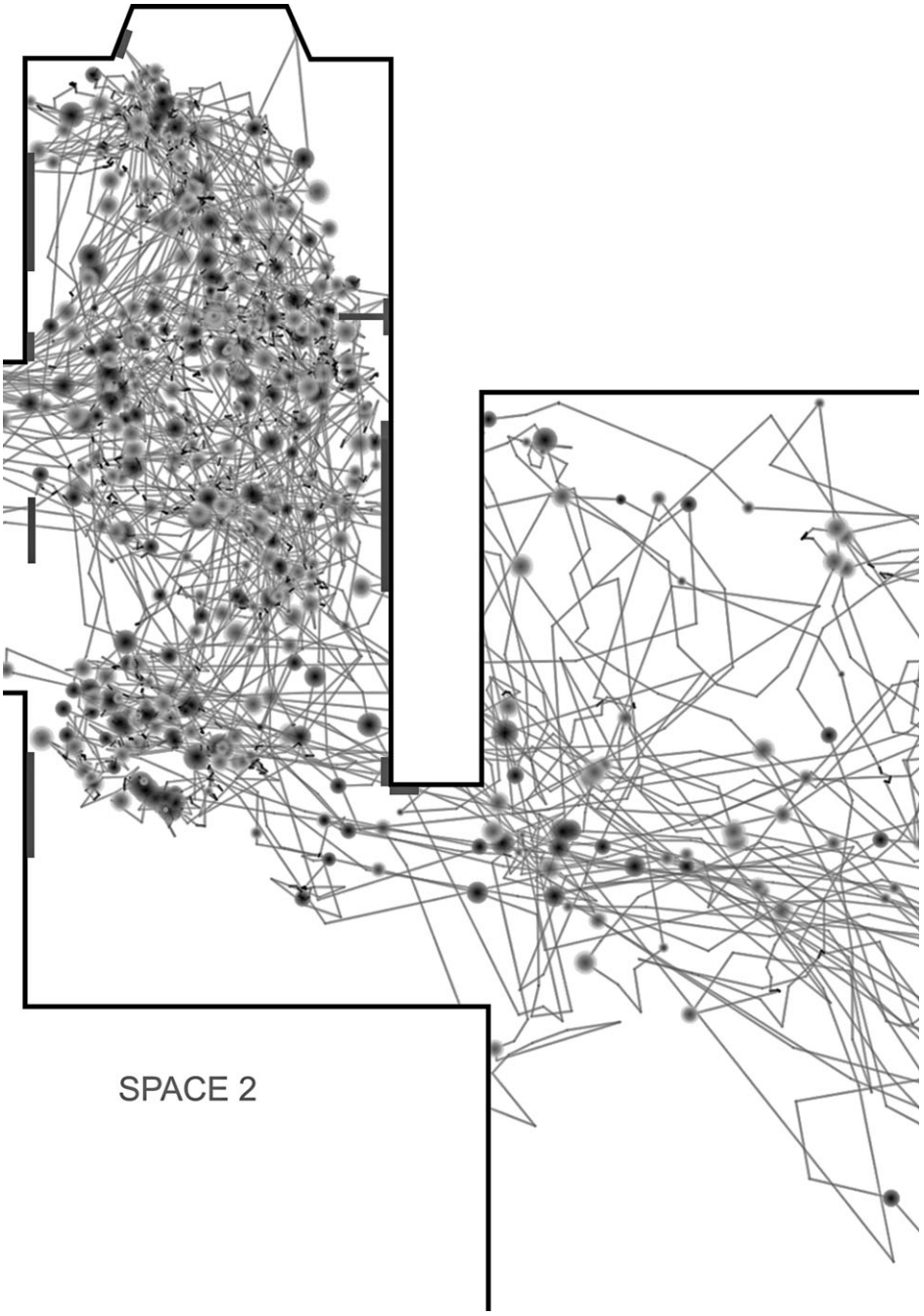

Figure 3. Paths (thirty light gray lines) and physiological reactions (light and dark gray circular markers) of thirty randomly chosen visitors in the museum foyer (Space 1) and first exhibition gallery (Space 2). The thick black rectangles within the wall perimeters indicate paintings and the T-shape represents didactic wall text. *Graphic courtesy eMotion.*

Striking are the differences in the spatial behavior and, especially, in the physiological reactions of the exhibition visitors between crossing the entrance foyer and entering the actual exhibition hall (Space 2). The physiological reactions of the participants to the paintings by Monet, Munch, and Liebermann in Space 2 increase dramatically (the Liebermann painting is shown in Figure 1). Their walking behavior also changes —now it is directed to the single exhibits.

By means of the eMotion-participant ID, the entrance and exit survey, as well as the locomotion and physiology data, could be collated. In the exit survey, visitors were asked more particularly about the artworks, which caused the strongest physiological reactions. After the visitor confirmed having seen the exhibition work reproduced on the exit-survey computer screen, appeared a list of factors. Heart-rate variability was found to be generally associated with the factors "aesthetic quality" (the work is rated pleasing; beautiful; emotionally moving; well-done with respect to technique, composition, and content; artist and importance in art history) and "surprise/humor" (the work is considered surprising; makes one laugh; partially, makes one think), and weakly associated with "curatorial quality" (the work is staged and presented well; is connected to other artworks) (for further details, see Tschacher et al. 2012).

In the psychophysiological literature, skin conductance variabilities (SCV) are described as indicators of emotional processes. Tröndle and Tschacher (2012) found correlations with the factor "dominance" (the work is experienced as dominant; stimulating). The physiological responses of visitors are significantly related to their aesthetic/emotional assessments of the artworks. The eMotion markers not only record physiological reactions, they also propose meaningful dimensions in the context of aesthetic experience. A detailed description of the mapping development appears in Tröndle et al. 2011 and a detailed technical description of the methodology appears in Tröndle et al. 2012.

Applying the Mapping to Analyze the Three Visitor-experience Types

From the data of 552 visitors to *11: 1 (+ 3)* who participated in the study, 467 (84.6%) could be assigned to a specific exhibition-experience type: either contemplative, enthusing, or social. (Out of the 576 total participants, twenty-four provided insufficient data to be typed, accounting for 552 data collections.) We randomly selected twenty-two visitor-data sets from each of these three types and visualized both their spatial behaviors and their physiological reactions in the maps. Our questions were, *Do the subjective data on assessing the exhibition have an impact on the objective data of visitor tracking and physiological measurements? Are the three visitor types mirrored in the mappings?* To find out, we designated six works located in the middle of the exhibition (Spaces 4, 5) that vary in subject, medium, and style: Walter Kurt Wiemken, *Meeresgrund*, oil on canvas, 1934; Otto Tschumi, *Fremde Landschaft*, oil on wood, 1924; Max Ernst, *Forêt–Lune*, oil on canvas, 1924; László Moholy-Nagy, *Schwarz-rotes Gleichgewicht*, collage, 1922; Julius Bissier, *15.8.62*, watercolor on paper, 1962; and graffiti-interventions from Nedko Solakov's *A Label Level*, gallery wall sketch, 2009 (see Figures 5a, b).

In the comparative mappings by experience type that follow, several considerations might assist in reading them. Are the visitors directly walking from artwork to artwork? Or are they wandering through the exhibition halls? How close or distant are they to the artworks? How much physiological activity do they emit?

Comparing the mappings in Figures 4a and 4b, we see that the twenty-two *enthusing-type* visitors show considerably higher physiological reactions, indicated by the bright and dark circles, than the contemplative types. Even though twenty-two participants occupy each of the mappings, Figure 4b appears more dense than Figure 4a. One sees more heart rate markers (HRV, bright gray markers indicating an aesthetic experience) and more significant fluctuations of the skin conductivity (SCV, dark gray markers indicating the experience of dominant and stimulating artworks). The aforementioned results of the visitor's assessments of the experiencing of beauty, famous art, and familiar art are also mirrored in the data of the physiological responses of this visitor type. The *enthusing visitor* is driven by an "aha-effect"—wandering around, recognizing famous and important artworks, being emotionally affected.

Although the physiological reactions of the group of *contemplative visitors* shown in the Figure 4a mapping seem to be less intense, the attention to single artworks is clearly more active than in Figure 4b. This finding goes hand in hand with the results for this experience type that we have discussed above, such as experiencing a connection to the artworks or enriching an understanding of the artworks. The mode of experience affects the visitor's motion in the museum space itself, and is measurable by his or her physiological responses. The *contemplative visitor* is more determined to dive into the experience of a single work of art and displays a definite focus on some artworks, but not equally.

Taking a very close look, another observation can be made about the contemplative type. According to the results of the experience-assessments, *contemplative visitors* are sensitive to the design of the exhibition and are open to the possibility of being surprised. Both conditions are evident in the mapping data of Figure 4a at the places contemporary artist Solakov produced on the pristine white walls small graffiti that comment, often quite amusingly, on the exhibition space or the artworks (for more detail, see Tröndle, Kirchberg, Tschacher, 2014b). Next to Ernst's *Forêt–Lune* (Forest–Moon) he inserts a tiny crescent moon, hiding at the edge of the frame "her skinny sister" (see Figures 5a, b). Looking once more at the short rectangles that represent a comment or sketch from Solakov, one can see how the *contemplative visitors* are attracted to these tiny interventions, in each case, indicated by an arrow in mapping Figure 4a. Because these interventions were made exclusively for the eMotion exhibition in complement to the show's design, this finding accords with the characteristics of this experiencing type.

What characteristics of the *social-experience visitor* reveal themselves in the mappings? Figure 4c shows data from another randomly selected group of twenty-two visitors to the St. Gallen exhibition. The differences from the enthusing and contemplative types are subtle, but detectable. Compared to the other types, the physiological responses to the artworks are weaker in the social-experience visitor. From the walking paths one also sees that although some visitors approach the artworks, others do not seem to pay much attention to them. The density of viewers in front of the artworks is significantly less than that shown in Figures 4a and 4b.

The mappings of the social-experience visitors conform to the results discussed earlier of the survey-assessments they made of the exhibition. The social visitor is neither interested in experiencing a deep connection with the artworks nor in experiencing the artworks in silence. He or she expects to be entertained

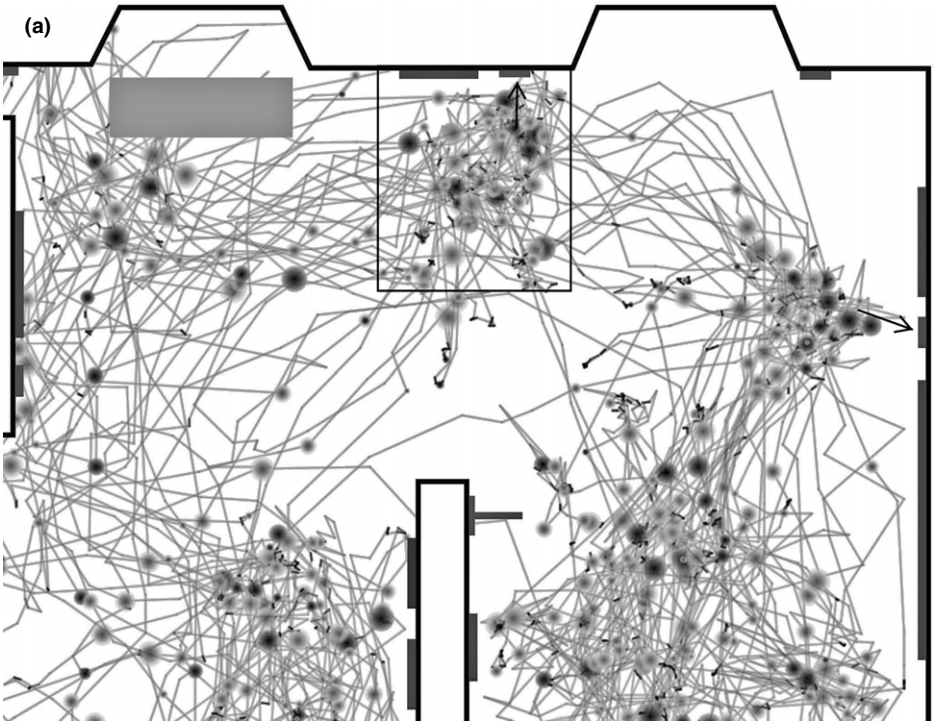

Figure 4a. Mapping of twenty-two *contemplative-type* visitors to the midpoint of the exhibition in Spaces 4–5. The large gray rectangle in the upper left represents a gallery bench. *Graphic courtesy eMotion*.

more by companions than the exhibition. Noteworthy also is that the physiological responses shown in Figure 4c are rather weak, especially so in comparison to the enthusing visitors shown in Figure 4b. This finding accords with our conclusions in Tröndle, Wintzerith, Wäspe, and Tschacher (2012), where we demonstrate that social markers of museum visitors, such as companionship and conversation, have a decisive influence on art reception. Talking in the art exhibition, in particular, decreased both the subjective ratings of the artworks (such as experiencing beauty) and the physiological reactions of the museum visitors.

IMPLICATIONS FOR A SOCIOLOGY OF EXHIBITIONS

Most of the empirical studies concerning visitor experiences assume that personal characteristics, such as socio-demographic traits and expectations, influence the visit experience. In line with this assumption, these studies follow the general idea that chronology and causality form experiences. Contrary to this presupposition, we found almost no impact of socio-demographic traits or expectations on the exhibition experience. Instead, causes for the tripartite exhibition experience could be found significantly through immediate encounters and assessments of exhibition aspects (artworks and arrangements, information and seating); imminent social context of the visit (company, talking); differing spatial behavior patterns; different physiological reactions to the artworks; and the individual ratings of selected artworks by the correlation to one of the experience types.

The mappings show that the spatial behavior of the enthusing type seems to be strongly affected by the space itself and its atmosphere. This type emits the strongest physiological reactions. Experiencing familiar and famous artworks and immediately communicating this experience to accompanying visitors seems to be important, as well. Unlike the enthusing visitor,

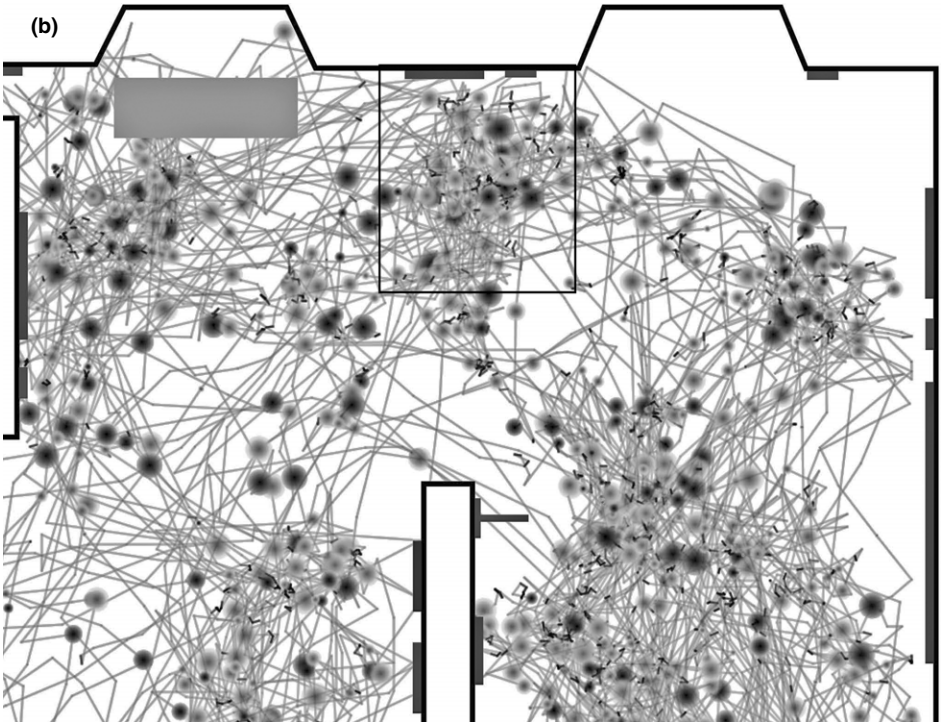

Figure 4b. Mapping of twenty-two *enthusing-type* visitors to exhibition Spaces 4–5. Visitors proceed counterclockwise from the entrance lower right to exit lower left. Visitors of this type show more physiological reactions, indicated by the bright and dark circles. *Graphic courtesy eMotion.*

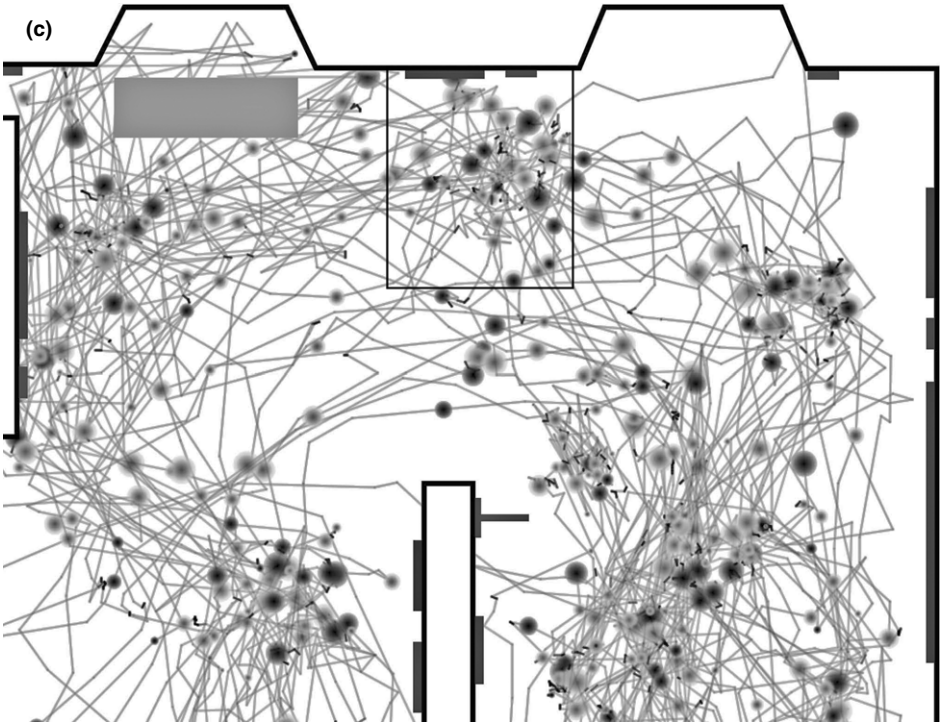

Figure 4c. Mapping of twenty-two visitors of the *social-experience type* to exhibition Spaces 4–5. Visitors of this type show that they are more engaged with other people than the art on view. *Graphic courtesy eMotion*.

the contemplative visitor demonstrates the clearest object orientation in his or her spatial behavior. The visitor paths and focused physiological-attraction points close to the artworks suggest that a single artwork attracts the contemplative type. Generally speaking, the physiological reactions of the contemplative visitor are weaker in comparison to the other two visitor types. According to their individual assessments, contemplative visitors are more interested in curatorially refined exhibitions oriented towards the artworks and their making. Emotionally, they do not engage heavily. They seem to be interested in artworks, both new and unknown to them. Quite different is the social type, who frequently talks during the visit and is less interested in experiencing the exhibition, reading labels and texts, and delving otherwise into content and art history. This was shown in the survey assessments and the mapping. For the social type and to a lesser extent the enthusing type, the museum visit is a highly social, shared occasion.

For our interdisciplinary research group, it was rewarding to see how well the tripartite-experience methodology uncovered these sociological criteria in the individual reactions of the museum visitors, compared to other groupings that were analyzed (see Tröndle et al. 2012). To museum administrators and curators, this in-depth study of the exhibition experience offers insights that may inflect the planning, production, and goals of future museum endeavors. The most important might be that the museum experience has a much larger effect on the visitor than one might have thought. A fine-arts museum visit should be understood as a highly contemplative (intellectual), enthusing (moving), or social experience. Independent from socio-demographic predispositions, visitors experience art exhibitions as one of the three outlined types. These findings provide evidence, one may argue, that the curator can indeed influence the visitor experience by paying more attention to the aspects of exhibition composition described by the eMotion research. The exhibition environment—be it an exhibition strongly driven by curatorial concerns, a blockbuster exhibition based on famous art or artists, or an exhibition encouraging interaction among visitors—can adopt distinct strategies that will appeal to specific audience types.

In light of the eMotion results, two strategies for museum development seem to be of particular relevance. The first is to adapt the museum display to increase the satisfying exhibition experience of the contemplative or enthusing or social type of visitor. This tailoring also could be seen as a specific branding mechanism for the museum. The second strategy is to integrate all three experience types in one exhibition concept, requiring a delicate balancing of multiple means to engage with an exhibition.

The technology deployed for the eMotion project allows for the study of visitor experience in museums in novel ways. We divulge, however, that the restrictions imposed on this study stem from the fact that it is an analysis of a single fine-art museum in central Europe. The transfer of our results to other museum types and in other countries may carry certain limitations. Second, the results reflect only museum visitors and not *non*-museum visitors. A third restriction is that the technological set-up for the movement and physiological tracking system, as well as for the data analyses, incur substantial effort and costs; in our project, a group of six scientists from various disciplines and several technicians and designers worked on this demanding task for several years. Nevertheless, using this integrated methodology, which goes far beyond the standardized methods applied in museum and visitor research to date, allows

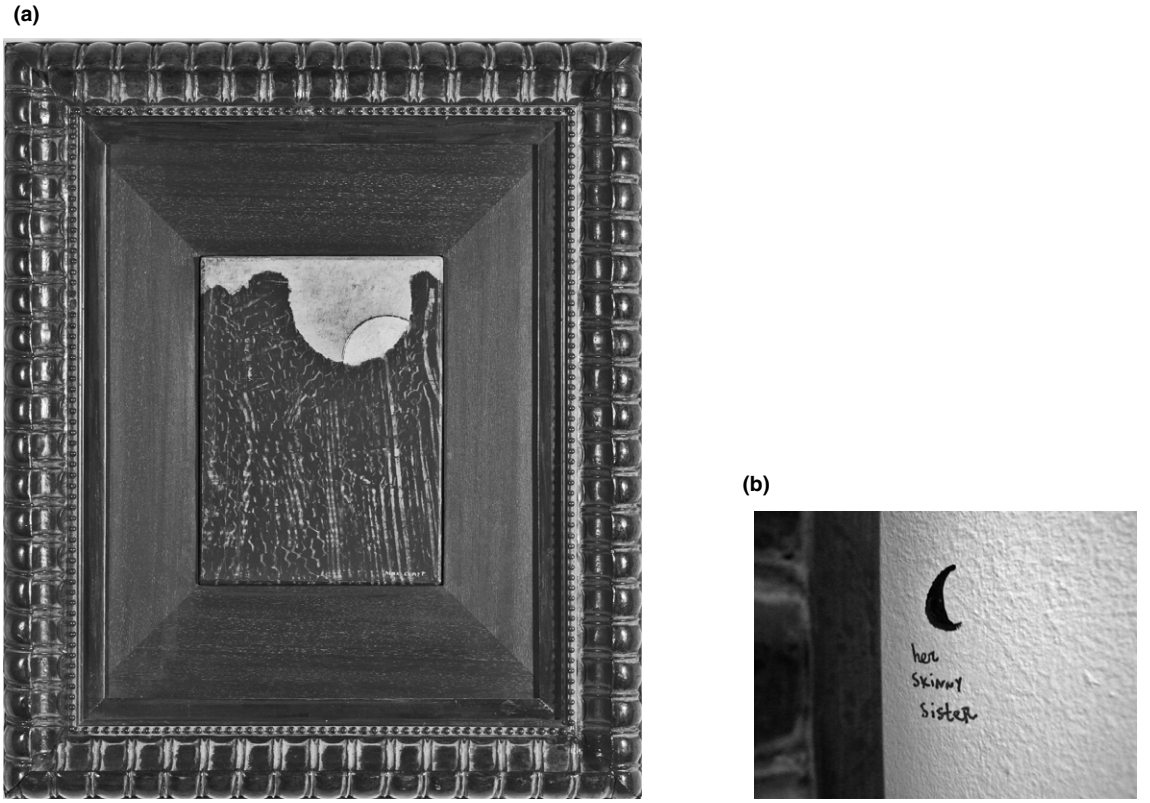

Figure 5. a. Max Ernst. *Forêt–Lune*. 1924. *Photo courtesy VG-Bildkunst, Bonn, and Kunstmuseum St. Gallen*. **b**. Nedko Solakov. "[Crescent Moon] her skinny sister," from *A Label Level*. 2009. *Photo by Stefan Rohner, courtesy of the artist and Kunstmuseum St. Gallen*.

for the creation of new and deeper understanding of the museum visitor experience, in an empirically viable fashion. Centered as it is on the spatial behavior and moments of arousal of museum visitors, this technology might easily be combined with mobile eye tracking (Heidenreich and Turano 2011) to test viewers' fixation patterns as well. Might that be the next step in museum-visitor research and empirical aesthetics? END

ACKNOWLEDGMENTS

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technology. We extend our deep gratitude to Roland Wäspe, Director of the Kunstmuseum St. Gallen, who made it possible for us to transform the museum into a laboratory. We also thank Johanna Schindler and Patricia Reed for proofreading our manuscript prior to submission to *Curator*. Last but not least, we wish to thank Jane Oliver for her careful and precise editing of the final manuscript.

Note to the reader: Appendix tables are published in the electronic version of this essay available at http://www.curatorjournal.org/.

NOTES

1. For further information and images of the St. Gallen museum and eMotion project, exhibition and installation, data retrieval tools, etc., see www.kunstmuseumsg.ch/pressebilder/index.php?anlass=elfsammlungen_bida ; Tröndle and Tschacher 2012; and www.mapping-museum-experience.com/en. The exhibition began in Space 2 with works by Monet, Max Liebermann (right painting in essay Figure 1), and Edvard Munch. Swiss art of the early twentieth century represented by Hodler (Figure 1) and Augusto Giacometti (cousin of Alberto), among others, were in the adjacent Space 3, moving on to Max Ernst (Figure 5a), Fernand Léger, and Le Courbusier in Space 4. Works in various media by László Moholy-Nagy, Hans Arp, Paul Klee, Julius Bissier, Cy Twombly, Yves Klein, Hans Hartung, and a cut-canvas by Lucio Fontana appeared in Space 5. Conceptual art by Max Bill and others, including a Günther Uecker canvas pierced back to front with nails, dominated Space 6 (Figure 2). Andy Warhol and Roy Lichtenstein constituted pop art in Space 7. The final gallery, Space 8, featured conceptual art by Imi Knoebel and On Kawara. *A Label Level*, thirty-two graffiti inscribed on the walls by Nedko Solakov, was commissioned for the exhibition (Figure 5b).
2. Pekarik et al. (1999) list two additional expectation and experience aspects: "imagining other times and places" and "seeing my children learn." However, the Smithsonian Institution findings are not consistent in the use of these phrases. We dispensed with them in our surveys because, in our view, they are appropriate for history, natural history, or science museums, but inappropriate for the art-museum visitors in our study.
3. Principal component analysis (PCA) is a common and established statistical procedure to reduce the complexity of observations so that the main underlying structure (the set of principal components) of a seemingly disorganized, that is, a complex and high-dimensional data conglomerate, can be revealed to best explain variances in the data. The reduction of the observed data aims to yield a set of values (factor scores) of variables (principal components) that are independent, that is, not correlated with each other (see Jolliffe 2002). There are other valid data complexity-reducing and internal structure-detecting types of statistical analysis, such as advanced factor analysis, correspondence analysis, or latent-class analysis. We chose PCA because (a) it has been applied to this field of research before (among others, by Pekarik et al. 1999) and we thus use it for comparative reasons, (b) in its exploratory simplicity it suits the exploratory nature of our research in one case museum, and (c) it provides us with variables that help us in making predictive models (for the subsequent regression analysis).
4. Due to the varimax rotation, the distribution of 493 visitors to an experience type is rather even; according to the individual maximum factor score, 33.7% of the analyzable cases belong to the group of contemplative experience, 31.6% to the group of enthusing experience, and 34.7% to the group of social experience. Although we took measurements from 576 visitors, here we use factor scores from the smaller number of 493 as twenty-four visitors submitted insufficient information about their experiences, and an additional 59 visitors could not be clearly categorized into one of the three experience dimensions.
5. Our study results indicate that socio-demographic predispositions show almost no statistical evidence to explain the exhibition experience. In

hindsight, we acknowledge that our study was only conducted in one museum of modern art in central Europe and therefore has its limitations. The results also consider only museum visitors, not non-museum visitors (other sociological studies dealing with museum experiences likewise do not analyze the experience of non-visitors, for example Bourdieu and Darbel 1991; Mastandrea, Bartoli, and Bove 2007). That said, our interest is not to compare museum visitors with non-visitors, but to understand various manners of experiencing exhibitions.

6. The factor scores for these three types of expectation are saved as independent variables for the subsequent regression analyses. Due to the varimax rotation, the distribution of 518 visitors to an expectation type is rather even; according to the individual maximum factor score, 30.3% of the analyzable cases belong to the visitor type that expects contemplative experiences, 28.7% to the type of enthusing expectations, and 29.1% to the type of social expectations. 70 cases (11.9%) could not be classified on account of those visitors' fragmentary or total lack of answers about their exhibition expectations.
7. The psychological pre-visit variable "mood" has been applied to explain exhibition experiences by de Rojas and Camarero (2006), as "state of mind," and by Csikszentmihalyi and Robinson (1990) as "mood" (see Kirchberg and Tröndle 2012).

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ADDITIONAL DATA APPENDICES

Additional statistical results of the eMotion study can be found in the data appendices of the online version of this article in *Curator* volume 58, number 2, accessible at http://www.curatorjournal.org/.