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Subtle Differences: Men and Women and Their Art Reception.

MARTIN TRÖNDLE, VOLKER KIRCHBERG,
AND WOLFGANG TSCHACHER

Introduction

Aesthetics: Does Sex Matter?

While presenting this manuscript to art practitioners and art theorists, we noticed that there is great discomfort confronting this topic. Some questions raised were why is such research conducted, what is it good for, and does it impose preconceptions on men and women. Since Bourdieu and Darbel,¹ it is widely assumed that sociodemographic factors such as education or profession have an impact on art reception. However, questions of basal sociodemographic factors like sex and age and their influence on art reception are seldom discussed. John Falk, a specialist on museum visitor studies, even states, "Quantitative measures such as demographics provide too little information about visitors in relation to museums to be useful variables for describing and understanding the museum visitor experience."²

Clearly, one has to admit that art reception is more complex and cannot be reduced to one simple factor. Along with sex, other criteria, such as the visitors' knowledge, their expectations and motivation to visit the museum, and the subject or style of the artwork influence art reception and visitor behavior. In the Swiss national research project *eMotion Mapping Museum Experience*,³

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we analyzed the effect of single works, different genres and varying art-historical periods of artworks.⁴ In addition, we tested how curatorial arrangements affect art reception;⁵ we tested the influence of companionship and communication on visitors' aesthetic perception,⁶ and we analyzed the influence of knowledge on the reception of fine arts.⁷

Astonishingly, approaching the question of the influence of sex on art reception, we found little research. A search in various peer-reviewed journals showed that the topic is practically nonexistent in scholarly publications. The same impression resulted from an extensive Internet search. This appears to us unusual.

Only in the field of evolutionary aesthetics⁸ do authors try, by referring to Charles Darwin⁹ and the concept of natural and sexual selection, first, to understand the emerging of aesthetics and art at all, and, second, to analyze the function of aesthetics in sexual selection. Following this line of argumentation, for example, Christopher Perricone¹⁰ sketches out why women would be better art critics and why most artists are male.¹¹

In German, there is only one word for gender and sex, *Geschlecht*; therefore, in our study, we did not differentiate in the survey of the biological and the social sex. But if one distinguishes between the biological sex and the social construction of gender, one finds various contributions. Gender questions have been discussed in museum studies¹² and more largely in feminist aesthetics,¹³ as has the question of representation of women in artworks or as artists themselves. According to Korsmeyer, in the postmodern debates about culture and society in the 1970s, a feminist perspective arose from a combination of political activism and the contemporary art world.¹⁴ Also, under the term "feminist aesthetics," a critical approach toward male-dominated art theory and also toward the art world and its institutions has been developed.¹⁵ From 1980 onward, the peer-reviewed, biannual *Woman's Art Journal* published articles debating critical feminist analysis of (contemporary) art, images of women, and many more issues (www.womansartjournal.org). While respecting the multifaceted and important influence of gender discourse from the past thirty years, focusing on institutional critique, critique of representation and sexual discrimination, to name but a few, analyses concentrating on the similarities and differences of men and women in their reception of art have been a largely neglected field of study.

The influence of sex on art reception has, as far as we know, not yet been analyzed in depth. Overall, we found only two empirical studies: İmgamoğlu and Yılmazsoy¹⁶ have conducted a study on gender and locality, observing visitor circulation behavior in the Turkish-Islamic Section of the Sadberk Hanım Museum in Istanbul. Referring to Klein¹⁷ and Hein,¹⁸ they assumed that visitors from different social and cultural backgrounds, as well as the different sexes, bring their unique experiences and prior knowledge to the ex-

hibitions and, therefore, make their own distinction of what to see and read. Hence, their hypothesis was that visitors' circulation behavior is sex specific.¹⁹ Observation (by following the visitors unobtrusively through the museum) and questionnaires were the methods they used to collect the data of fifty-two visitors. The second study investigated the viewing time of artworks in relation to age, gender, and group size.²⁰ A total of 150 individuals looking at six paintings in the Metropolitan Museum of Art in New York were observed, and the time the visitors spent in front of the artworks was measured by stopwatch. The authors conclude that viewing time was not related to gender or age (mean viewing time 27.2 seconds, median 17.0 seconds).

In our research project with 576 participants, we were able to use the latest technology of time and locality tracking (which allows for high precision), electronic surveys, and physiological measurements. The latter, in particular, enables the measuring of nonverbal bodily responses such as moments of aesthetic-emotional arousal.²¹ As Hooper-Greenhill states, although the experience of objects and artworks remains nonverbal and unarticulated, still it activates emotions and thereby causes bodily responses.²² In the present research project, these responses were made visible via physiological measurements and their subsequent transformation into mappings of the museum experience.

The analyses of these data sources and data representations will not be presented deductively, because they were not hypotheses-driven. Instead, we will investigate the influence of sex on the reception of artworks inductively. Questions we will investigate are the following:

1. What are the different expectations between men and women on entering a fine-art museum?
2. Do men and women show differences or similarities in their museum visit frequency and/or foreknowledge of art?
3. Generally speaking, how do men and woman evaluate their exhibition experience?
4. More specifically, do men and woman evaluate the various aspects of the exhibited artworks differently?
5. Is there a demonstrative difference of behavior in the exhibition spaces across the sexes?
6. Do they differ in respect to the observation time of artworks?
7. Is there a difference in respect to their aesthetic-emotional involvement?
8. Do they have a differing recollection of the exhibited artworks a few weeks subsequent to their museum visit?

These questions will be analyzed in depth, via a methodological triangulation combining various surveys, position tracking, and physiological measurements of the museum visitors.

Methods

Research Setting

During a research phase of three months (June–August 2009) in the St. Gallen Fine Arts Museum (Switzerland), we investigated visitor responses to the exhibition *11 : 1 (+ 3)*, which was specifically curated for this study. The exhibition consisted of approximately seventy artworks from the museum collection combined with fourteen detailed text panels presenting collector biographies who had contributed to the collection by their donations, which illuminates the cryptic title *11 : 1 (+ 3) = Eleven Collections and Three Donations for One Museum*.

The exhibition presented a loosely chronological, art-historical overview from around 1900 to the present, including artists such as Claude Monet and Max Liebermann (Space 2); Ferdinand Hodler and Giovanni Giacometti (Space 3); Max Ernst, Fernand Léger, Paul Klee (Spaces 4 and 5); Max Bill, Camille Graeser, Günther Uecker (Space 6); Andy Warhol, Roy Lichtenstein, James Rosenquist (Space 7); and Thomas Virnich, Imi Knoebel, On Kawara (Space 8).

Figure 1 shows the floor plan of the museum. The exhibition rooms (Spaces 2 to 8) were located on the ground floor; the hanging of the artworks (dark gray rectangles, numbered 1–72), as well as the text panels (dark gray T's, 101–114) and three benches (light gray rectangles) are depicted in the figure. In the foyer (Space 1), question booths for the entrance survey could be found next to the ticket counters. Another survey was carried out at the exit of the exhibition (exit survey, Space 9, not shown).²³

Set-Up of the Field Study

All visitors entering the museum during the research phase were invited to take part in the project. Adult participants, able to communicate in English or German, were included. For technical reasons, only visitors in groups up to three people could participate.

Visitors who agreed to participate were provided with a data glove that was worn during their tour through the exhibition. It was designed to measure two physiological parameters heart rate (HR) and skin conductance level (SCL) and their respective variability (HRV and SCV) as well as the visitor's path and time durations spent in front of an artwork. The position tracking was carried out every second, identifying up to five visitors at the same time with a precision of 15 cm. The data glove allowed wireless position and path tracking, so that the participants could freely walk through the show (Spaces 2–8), look at exhibited artworks and read the text panels. Together with the physiological data, their positions and paths were sent to, and recorded on, a computer server.

In addition to position tracking and physiological measurements, the participants were asked to complete a standardized *entrance-survey* before

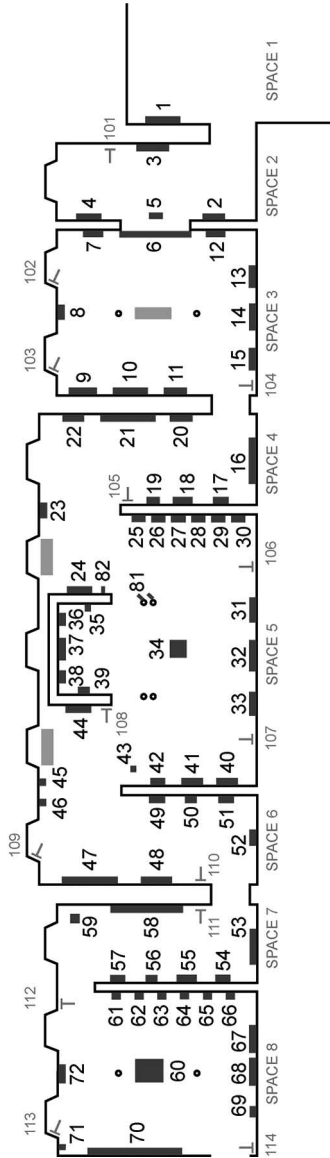


Figure 1. Floor Plan of the Museum: the numbers indicate the different spaces (1–8), artworks (1–82), and text panels (T 101–114).

their tour through the exhibition (Space 1). Besides collecting the standard sociodemographic variables, visitors’ motivation, their general attitude toward and expectations of art exhibitions, and their knowledge of art were queried. After the visit, project assistants carried out an individualized *exit-survey* (beyond Space 8) so that two survey data sets were collected for every participant. In accordance with the expectations mentioned in the entrance-survey, the questions in the exit-survey sought to investigate the visitors’ experience and behavior in the exhibition. They were complemented by an evaluation of those individually selected artworks that had provoked significant physiological reactions in the respective visitor. Another part of this multimethod study was a *post-visit survey*: visitors were able to log in to a website and to complete this questionnaire three to six weeks after their exhibition visit.

In the following, we will, first, report the results from the entrance and exit questionnaires; second, we will analyze the physiological and tracking data, which were collected using the data glove; third, we will report the results of the post-visit survey in respect to men and women and their art reception. Last, we will discuss our findings.

Analysis I: Results from Self-Report Data

Results of the Entrance-Survey

We first characterize the composition of the study sample and report on sociodemographic data. This will provide a framework for subsequent results and allow comparison of the findings to other studies.

GENERAL SOCIODEMOGRAPHIC ANALYSES

In total, 576 visitors participated in our study. Among these 576 visitors, 351 were women (61.6 percent) and 219 men (38.4 percent); six persons had missing information on sex. The sample showed no age difference between the sexes ($F[565,1]=0.26$ n.s. (nonsignificant); 348 female, 219 male, 3 persons with missing information on age). The mean age of women was 45.6y (standard deviation [SD]=16.7), of men 46.4 (SD=16.7). The largest age group in both sexes was between 50y and 55y.

SEX AND EDUCATION

We monitored the education levels of visitors. Six categories were used: "elementary/secondary school, O-Level (UK)" (9 percent of female visitors; 6 percent of male visitors); "apprenticeship" (17 percent of female visitors; 8 percent of male visitors); "A-Level (UK), high school (US)" (27 percent of female visitors; 26 percent of male visitors), "graduate studies: sciences/engineering" (6 percent of female visitors; 23 percent of male visitors); "graduate studies: humanities/social sciences" (25 percent of female visitors; 24 percent of male visitors); "graduate studies: arts, cultural sciences" (17 percent of female visitors; 13 percent of male visitors). Thus, two categories showed differing results ($n=569$): Apprenticeship was the highest level of education in a larger proportion of the female visitors; more male visitors had graduated in sciences or engineering, in contrast to the women. Sixty percent of men had an academic degree but only 48 percent of the female visitors. This distribution of education levels is common in the respective age cohorts of the Swiss population (socioeconomic details of the participants and a comparison to the general Swiss population are provided by Kirchberg and Tröndle²⁴). We decided, however, to check in the following analyses whether education levels were explanatory for sex and age differences. In other words, we considered education as a potential confounding variable.

SEX AND OCCUPATION

The sample was categorized according to occupational and vocational criteria. We used six categories: worker/employed (16 percent of female visitors; 15 percent of male visitors); middle and top management (21 percent of female visitors; 27 percent of male visitors); free-lance professional, artist (19 percent of female visitors; 25 percent of male visitors); in training, student (15 percent of female visitors; 14 percent of male visitors); teacher (9 percent of female visitors; 6 percent of male visitors); housewife, family manager, retired (19 percent of female visitors; 13 percent of male visitors). The differences between female and male visitors were statistically nonsignificant ($\chi^2(5)=8.93$ n.s.).

FREQUENCY OF MUSEUM VISITS

In the entrance-survey, visitors were asked "How often have you been in an art exhibition or art museum within the past 12 months?" The answer was that 35.9 percent visited fine-art museums more than sixteen times a year, while 21.5 percent visited museums 6–15 times per year. Another 23.2 percent answered to visiting fine-art museums 3-times a year, and 19.4 percent of the participants answered that they visit fine art museums only once or twice a year. There was no statistical difference between male (median, ten visits per year, mean 17.1) and female (median, seven visits per year, mean 14.3) visitors with respect to the frequency of their museum visits. We found that the visitors' age was linked to the frequencies: $t(570)=2.33$, $p<.05$. With increasing age, visitors were more frequent museumgoers. Both findings were stable when education levels were considered in the models. For 37 only of females and 45 only of males, the present visit was their first visit to the St. Gallen Museum; this difference was not statistically significant ($\chi^2(1)=3.50$ n.s.).

SEX AND ART FORMS

Visitors responded to the question "Which of the following art forms do you like?" on five-point Likert scales. Out of eight art forms (paintings, drawings, photography, video, performance, sculpture, installation, and sound), two were preferred by men: video and installation. When age and visitor's education were entered as covariates, sex remained as a significant predictor, indicating the male preference for these two art forms.

VISITORS' EXPECTATIONS

The visitors' expectations prior to entering the exhibition were measured on twelve different five-point Likert scales. Table 1 gives the details of the multiple regression analysis of each scale, that is, each aspect of expectations, with age and gender of visitor as predictors. Eight out of twelve models were significant. This indicates that especially age, and in three models additionally gender, had a marked influence on the visitors' expectations (Table 1).

The older the museum visitors were, the more important it was for them to improve their understanding of fine arts with the exhibition (+5.2****). Also, the older they were, the more they wanted to experience the beauty of the artworks (+4.2****), to see something familiar, something they already knew (+4.2****), as well as to see well-known artworks (+4.9****), and to enjoy the silence of the museum space (+3.3**). On the contrary, the younger the visitors were, the more important it was for them to be entertained (-4.3****).

For female visitors, it was important to be part of the exhibition with all their senses (+4.4****), and to improve their understanding of fine arts with the exhibition (+2.6**). Male visitors liked to be entertained (-2.7**). When education levels were included in the models, all significant predictors were

Table 1. Regression models of visitors' expectations explained by age and gender (assessments prior to the visit).

I would like	n	Variance explained by Age and Gender	Age (t value)	Gender (t value)
the exhibition to be thought-provoking.	567	0.4%	+0.8 ns	+1.4 ns
the exhibition design to be convincing.	567	0.4%	+1.2 ns	+1.0 ns
to enjoy the silence of the museum space.	567	2.2%	+3.3**	+1.6 ns
to improve my understanding of fine arts with the exhibition.	564	5.6%	+5.2****	+2.6**
to have a nice time with my family and/or friends.	534	0.6%	-0.2 ns	-1.8 ns
to be part of the exhibition with all my senses.	563	4.2%	+2.3*	+4.4****
to experience a deep connection to the art that is shown.	562	1.4%	+2.7**	+0.7 ns
to see something familiar, something I already know.	566	3.2%	+4.2****	+1.0 ns
to experience the beauty of the artworks.	562	3.5%	+4.2****	+1.8 ns
to be entertained.	560	4.3%	-4.3****	-2.7**
to be surprised by new impressions.	566	0.0%	-0.7 ns	+0.1 ns
to see well-known artworks.	565	4.0%	+4.9****	+0.4 ns

ns, not significant; * $p < .05$; ** $p < .01$; *** $p < .001$; **** $p < .0001$.

Positive t-values of gender mean that the respective expectation scale value is larger in females; n, number of observations in model.

Positive t-values of age mean that the respective expectation scale value is larger in older visitors.

corroborated, and two more associations with sex reached statistical significance levels ($p < 0.05$): women expected to experience the beauty of artworks more and expected less to have a nice time with family or friends.

Results of the Exit-Survey

VISITORS' GLOBAL EVALUATIONS IN RESPECT TO AGE AND GENDER

We found that the exhibition was evaluated more positively with increasing visitor age (Table 2). This was true especially for the evaluations of the

Table 2. Regression models of visitors' global evaluations explained by age and sex (assessments after the visit) (scale: 1=poor . . . 5=excellent).

	n	Variance explained by Age and Sex	Age (t value)	Sex (t value)
Exhibition in general	547	5.3%	5.2****	2.0 ns
Selection of artworks	535	1.5%	2.8**	0.8 ns
Arrangement of artworks	536	2.5%	3.7***	0.5 ns
Labeling of artworks	540	3.5%	1.6 ns	4.1****
Scope of information on artworks	525	5.2%	4.3****	3.2**
Exhibition space	547	0.9%	1.8 ns	1.3 ns
Accommodations for seating	426	2.6%	0.7 ns	3.3**

ns, not significant; * $p < .05$; ** $p < .01$; *** $p < .001$; **** $p < .0001$

Positive t-values of age mean that the evaluation was more favorable with increasing age of visitors.

Positive t-values of sex mean that the respective evaluation is more positive in females; n, number of observations in model.

exhibition in general (5.2****), for the scope of information given (4.3****) and for the arrangement of the artworks (3.7***). We also found an influence of the visitors' sex, namely, that female visitors gave more favorable evaluations to the aspects listed in Table 2; they especially regarded the labeling of artworks (4.1****), the information on the artworks offered (3.2**), and the accommodations for seating in the exhibition halls (3.3**). These significant associations remained stable when visitor's education was additionally entered as a covariate. Accounting for education made sex a significant predictor for visitor's evaluations of the exhibition in general (which was higher in females).

SEX AND AGE IN RESPECT TO AESTHETIC-EMOTIONAL INVOLVEMENT

After their visits to the exhibition, participants rated the aesthetic and emotional appeal of selected artworks they had just viewed. The scales that were used for the assessment inquired nineteen items pertaining to aesthetic-emotional involvement.²⁵ These items are listed in Table 3a and 3b. We estimated the influence of the visitors' sex and age on aesthetic-emotional factors in a mixed-effects regression analysis, which was controlled for the variance explained by viewed artworks and the individual visitor (so-called random effects). It was found that the majority of the items were associated with the age and the sex of the respective visitor.

We found quite generally that the artworks were evaluated more positively by women, especially the content/topic of the artworks (4.1****), the composition of the artworks (2.6*), the artist (2.4*), the importance of the artwork in art history (2.9**), the presentation of the artwork (2.4*), and also its connection to the other artworks of the exhibition (2.7**). Also, with rising age, seven out of eight factors were highly significantly better assessed (Table 3a). All significant findings were stable when education level was

Table 3a. Mixed effects models of the associations of aesthetic-emotional assessments (Scale: 1=poor, ... 5=excellent) with age and sex.

What do you personally think of the following aspects of this artwork? (dependent variable)	random effect "artwork": variance component	random effect "visitor": variance component	fixed effect "Age" (t value)	fixed effect "Sex" (t value)
content/topic	5.8%	14.3%	3.0**	4.1****
artistic technique	9.3%	19.2%	3.4****	2.0 ns
composition	5.3%	17.7%	1.1 ns	2.6*
beauty	11.1%	12.5%	3.3****	1.0 ns
the artist	13.0%	18.0%	4.5****	2.4*
its importance in art history	16.5%	29.7%	5.7****	2.9**
presentation of the artwork (hanging, scenography)	10.8%	17.9%	3.7***	2.4*
connection to the other artworks of the exhibition	10.6%	22.7%	2.7**	2.7**

Table 3b. Mixed effects models of the associations of aesthetic-emotional assessments with age and sex. This artwork . . . (scale: 1 = strongly disagree . . . 5 = absolutely agree)

This artwork . . . (dependent variable)	random effect "artwork": variance component	random effect "visitor": variance component	fixed effect "Age" (t value)	fixed effect "Sex" (t value)
pleased me, I liked it.	8.6%	7.5%	0.5 ns	-0.8 ns
made me laugh.	15.6%	21%	-4.5****	0.5 ns
surprised me.	8.8%	20.5%	-0.2 ns	-0.4 ns
made me think.	2.9%	18.9%	-0.2 ns	-0.2 ns
moved me emotionally.	7%	15.2%	1.4 ns	2.4*
frightened me.	7.9%	13%	-3.4***	-1.8 ns
made me angry.	3.2%	8.4%	-1.6 ns	-1.1 ns
made me happy.	8%	16.3%	2.9**	-0.3 ns
made me sad.	6.8%	14%	-2.0 ns	-2.0*
was activating, stimulating	7.2%	10.7%	1.7 ns	-0.1 ns
was dominant, strong	11.3%	11.3%	1.1 ns	2.2*

$p < .05$; ** $p < .01$; *** $p < .001$; **** $p < .0001$.

Positive t-values of sex mean that the respective aesthetic-emotional assessment is larger in females. Positive t-values of age mean that the respective aesthetic emotional assessment is larger in older visitors.

considered. Thus, the associations of Table 4a are not biased by the different education backgrounds of men and women.

Likewise, the emotional assessments were partially sex specific. Men rated artworks more often as making them feel sad (-2.0*). With education included in the model, men also reported to be significantly more frightened by the artworks. Women instead were more often emotionally moved (2.4*), and they were experiencing the artworks more often as strong (2.2*), yet this latter association lost significance when education was considered as a covariate (Table 3b).

Concluding these analyses of the entrance and exit surveys, we found that age and sex had considerable impacts on the expectations and experiences of the exhibition in general and on the general aesthetic-emotional assessments of artworks. These associations could not be explained by sociodemographic differences between female and male visitors. The number and clearness of differences were unexpected. To gain a better understanding, we will in the following section complement the self-report data from the questionnaires by the objective data from the movement and physiological data.

Analysis II: Physiological Results

At the exhibition entrance, visitors received an electronic glove that included measurement sensors and a sender that transmitted physiological and position data to wireless receivers in all halls of the exhibition. In previous papers, we reported the general finding that physiological responses were significantly associated with aesthetic-emotional assessments of the art-

works.²⁶ Here, we wish to explore in more detail which roles the visitors' sex and age played in this context.

It was found that women had significantly lower skin conductance levels (SCL) and higher heart rate (HR), which is a trivial result due to the sex-specific physiology of the human body. This need not mean, however, that female and male visitors have different physiological responses to the exhibited art *because of the art*. The same applied to the general effects of age on physiology: the older the visitors, the lower was the physiological response in all four variables. Therefore, we may conclude that such general age- and sex-related differences in the visitors' physiology may not have their main origin in different aesthetic responses. Below, however, we will illustrate *individual* physiological responses that may well be interpreted in the context of museum psychogeography and the aesthetic environment.

Are men and women affected in a different way by the museum and its exhibits? Can these effects be analyzed with the help of the physiological and cardiologic measurements, as well as the recorded visitor paths?

In the following, these questions will be examined by individually analyzing the approximately seventy works, which were shown in the exhibition. In order to test if men and women are affected differently, the cartographies below portray the paths and physiological reactions of twenty-three randomly chosen male and female visitors (n=46). These cartographies were analyzed with respect to varying bodily responses in front of single artworks in both visitor groups. The cases in which such differences were clearly visible were then compared to a second sample of again forty-six randomly chosen male (twenty-three) and female (twenty-three) visitors. Only the cases in which the same distinct responses in front of an artwork were visible in both samples (n=92) will be reported here.

The following figures (Figures 2a and 2b) depict a section of Space 2, the first exhibition hall. The hall's floor plan is represented by a black line, the artworks by dark gray rectangles, and a detailed text panel by the gray "T". The two gray, small rectangles are part of the artistic intervention *A Label Level*, 2009, by Nedko Solakov. The visitors' positions were tracked once every second and the recorded spots connected, so that the light gray lines represent the visitors' paths through the exhibition. The slower a visitor moved, the darker the line becomes. The light gray and dark gray round markers display the locations at which the visitors showed strong physiological reactions (heart rate and skin conductance).

In the figures below, the *light gray markers* depict fluctuations in heart rate (HRV). Our results showed that these fluctuations can generally be associated with the factors "Aesthetic Quality" and "Surprise/Humor" and weakly associated with "Curatorial Quality."²⁷ Skin conductance fluctuations (SCV) are portrayed by the *dark gray markers*. In Tröndle et al.,²⁸ the development of the cartographies is explained in more detail.

Analyzing Figures 2a and 2b, several differences in the behavior and reaction of the two visitor groups become apparent:

First of all, female visitors (Figure 2a) clearly demonstrated more fluctuations in skin conductance (SCV, dark gray markers) than male visitors (Figure 2b). In psychophysiological literature, skin conductance fluctuations are described as an indicator of emotional processes. Tröndle and Tschacher

Visitor paths (fine gray lines) and their physiological reactions (light and dark markers):

Figure 2a: Twenty-three randomly chosen *female* visitors

Figure 2b: Twenty-three randomly chosen *male* visitors

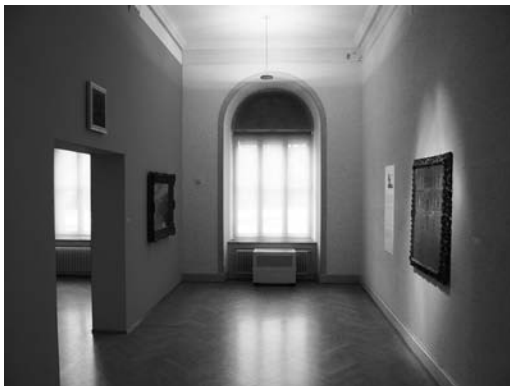
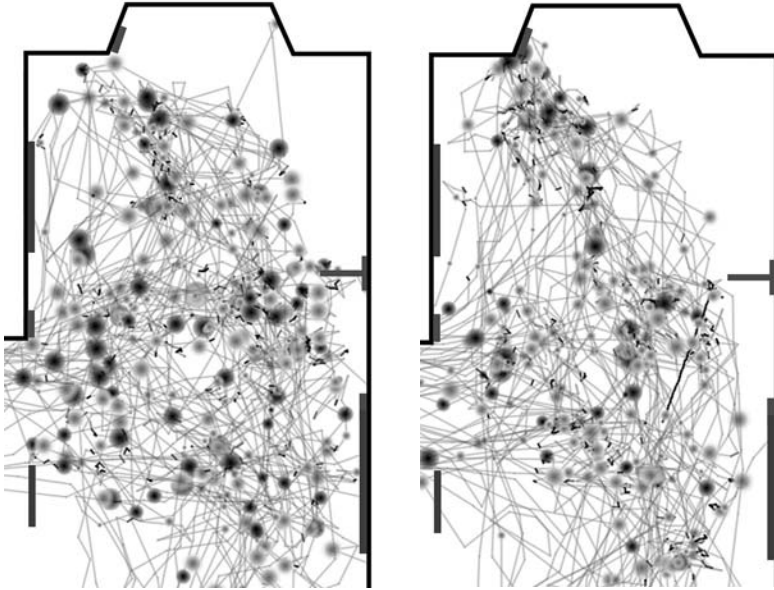


Figure 2c: Installation Shot: View from Space 2 into Space 3. Above the doorway, Ferdinand Hodler's *Selbstbildnis*, 1917. Beneath, on the right, Max Liebermann's *Atelier des Malers am Brandenburger Tor in Berlin*, 1902. On the opposite side, Claude Monet, *Palazzo Contarini, Venedig*, 1908, and a wall text

found correlations with the factor “Dominance,” that is, how “strong” an artwork was classified.²⁹ One may conclude that female visitors experienced the works to be “stronger” than their male counterparts.³⁰ This physiological reaction seems to appear in front of Ferdinand Hodler’s *Selbstbildnis* in particular, which was hanging above the passage. In a close-up, the difference is conclusively noticeable (Figure 3a and 3b).

Close-up: Paths and physiological reactions in front of Ferdinand Hodler’s *Selbstbildnis*:

Figure 3a. Twenty-three randomly chosen *female* visitors

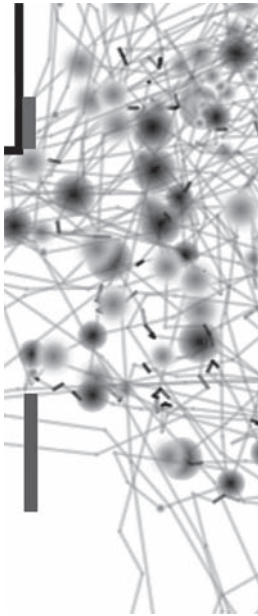


Figure 3b. Twenty-three randomly chosen *male* visitors

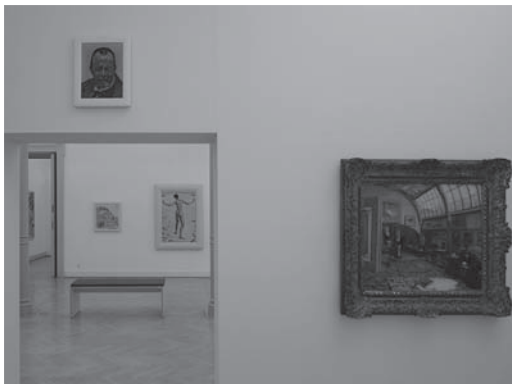


Figure 3c. Picture of Ferdinand Hodler’s *Selbstbildnis*, 1917 (above the passage; on the right hand side, an artwork by Max Liebermann

This positioning was installed rather tongue-in-cheek, so that Hodler's gaze was directed toward the nude in the next room, *Linienherrlichkeit*. We might now conclude that the female visitors especially understood the "joke" or were at least moved by the curatorial setting in which Ferdinand Hodler's *Selbstbildnis* (Self-portrait) was positioned above the passage.³¹

Another difference in the two visitor groups can be observed in front of the information text on the wall ("T' 101). It is clearly visible that the female visitors (Figure 4a) show more orange and yellow markers (heart rate variability) in front of the text. In addition, more female visitors seem to have actually read the text.

In the close-up, we find another difference between the two groups. This time, it is not the female but the male visitors who show more attraction and arousal. This can be seen in front of one of the rather small "tags" by the artist Nedko Solakov and his work *A Label Level*, which was commissioned for this exhibition (Figure 5c). Solakov created more than thirty of these tags, commenting on the artworks, labels, or other things in the exhibition with a black felt pen.³² This tag on the wall (about 3 × 8 cm) refers to the aerator in front of the window. Solakov wrote, "The 'wind' behind you would love to go on vacation in an exotic place during the hurricain [sic] season."

This work seems to attract especially male visitors, as one can see in the comparison of Figures 5a and 5b. One has to approach the work very closely to read it, which most of the male visitors did. Here (Figure 5b), they also clearly show more physiological reactions than the women, who apparently did not approach the tags as closely.

Slight differences are observable in front of Giovanni Giacometti's *Portrait Zaccaria Giacometti* (Place ID 12) in Space 3 (Figure 6c). Male visitors were more attracted by the *Portrait Zaccaria Giacometti*, which is indicated by the

Close-up: Paths and physiological reactions in front of Text 101, Space 2

Figure 4a. Twenty-three randomly chosen *female* visitors.

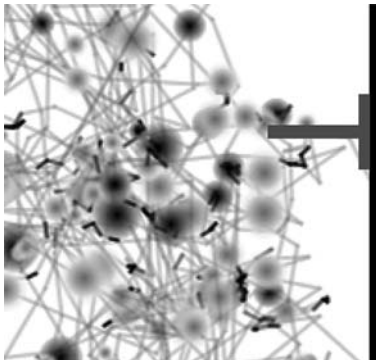
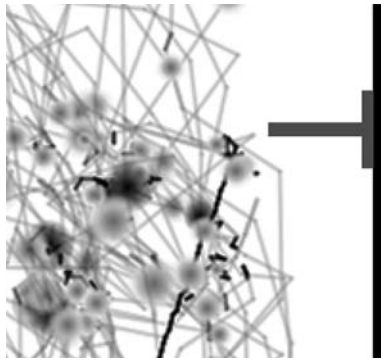


Figure 4b. Twenty-three randomly chosen *male* visitors



Paths and physiological reactions of:

Figure 5a. Twenty-three randomly chosen *female* visitors

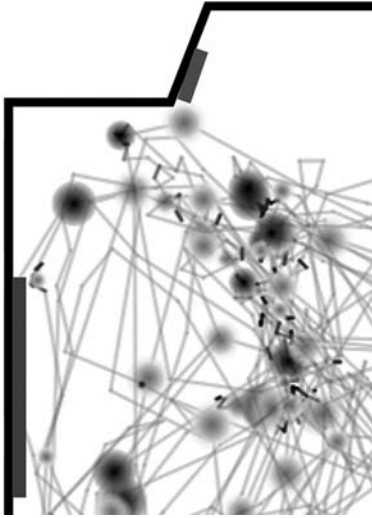


Figure 5b. Twenty-three randomly chosen *male* visitors

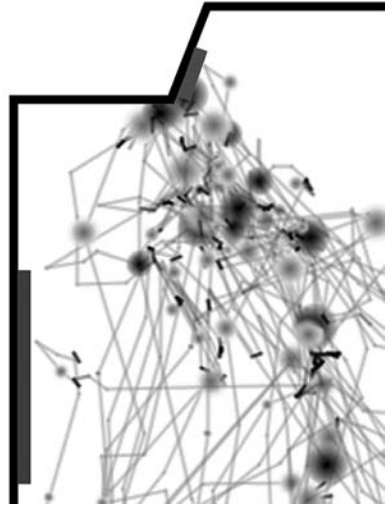
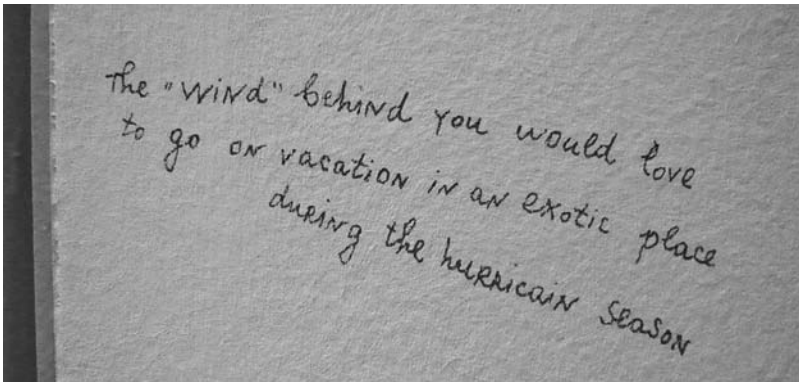


Figure 5c. Picture of one tag in the series of Nedko Solakov *A Label Level*.



density of the paths, and they show slightly more physiological reactions: the heart rate significances (light gray markers) are especially evident (Figures 6a and 6b). Additionally, walking behavior is more clearly focused on the work in Figure 6b.

Furthermore, slight differences are apparent in front of *Nr. 43, 1965* (Place ID 49). In comparison to the male visitors, female visitors were more attracted by the work of Max Bill (Figure 7a). Unusual is the diagonal hanging of the square and its color composition (Figure 7c).

Paths and physiological reactions of:

Figure 6a. Twenty-three randomly chosen *female* visitors

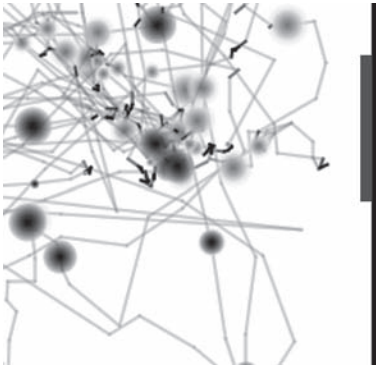


Figure 6b. Twenty-three randomly chosen *male* visitors

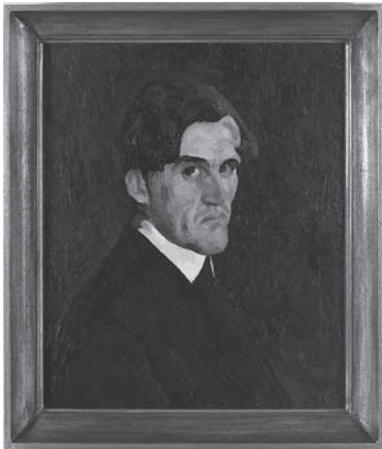
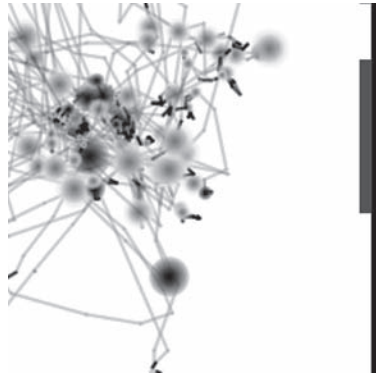


Figure 6c Picture of Giovanni Giacometti, *Portrait Zaccaria Giacometti* (Place ID 12)

Strong differences in the physiology and in the attraction to the artworks could be found in Space 7. First, in front of Andy Warhol's *Campbell's Condensed Tomato Soup* (Figures 8a–c):

And, second, in front of Dieter Roth's *Doppelzweg*, 1969 (Figure 9C), two garden gnomes are casted in chocolate. Only a jelly bag cap is looking out of the chocolate stick.

The last work that evoked different visitor behavior and physiological reactions was located in Space 8, the work *Lup-bup Zhir-Pow!*, 1994/1997, by Ingrid Calame, a very shiny artwork made out of enamel paint on aluminum.

Out of the approximately seventy artworks that were shown in the ex-

Paths and physiological reactions of:

Figure 7a. Twenty-three randomly chosen *female* visitors

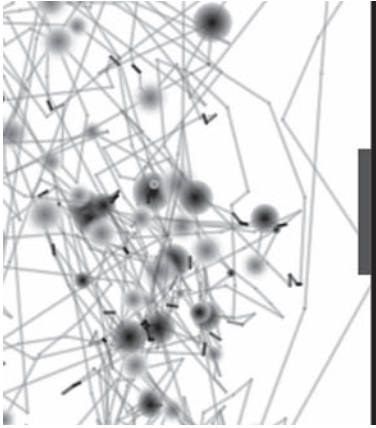


Figure 7b. Twenty-three randomly chosen *male* visitors

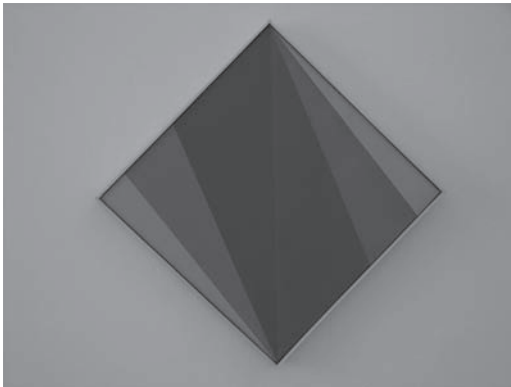
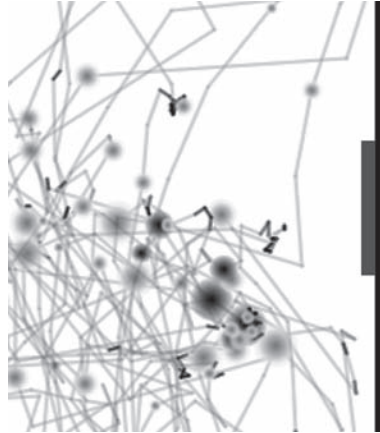


Figure 7c. Picture of Max Bill, *Nr. 43*, 1965 (Place ID 49)

hibition, only these seven works evoked considerably different reactions in male and female visitors. Every tenth work in the exhibition had a varying effect on male and female visitors. On one hand, this does not seem to be very much; on the other hand, it is nonetheless remarkable that such effects can be observed. Unfortunately, there do not seem to be any characteristics that would easily explain these differences. The artworks were hanging in different exhibition spaces, representing different periods and different styles, and are made of different materials. Also, the wall text evoked a considerably different behavior. Further analyses must be conducted to test possible criteria explaining these distinct reactions.

Paths and physiological reactions of:

Figure 8a. Twenty-three randomly chosen *female* visitors

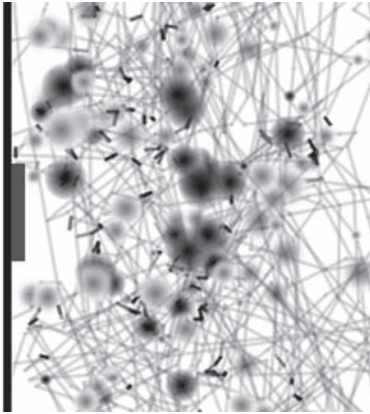


Figure 8b. Twenty-three randomly chosen *male* visitors

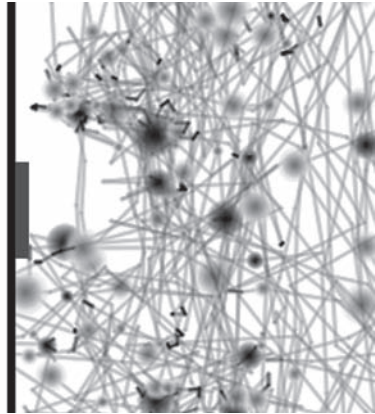


Figure 8c. In front, Andy Warhol *Campbell's Condensed Tomato Soup*, 1962 (Place ID 56)



Analysis III: Results from the Comparisons of Observation Time

We analyzed the average time visitors spent in the exhibition halls, which was about thirty minutes. This may not be very long; but, on the other side, the exhibition contained only seventy artworks, which were all coming from the collection of the museum, and regular visitors of the Kunstmuseum St. Gallen had seen them before. Finally, we only measured the time from entering Space 2 and leaving Space 8 (buying tickets, answering the questionnaires, visiting rest rooms, and other activities have not been put to account

Paths and physiological reactions of:

Figure 9a. Twenty-three randomly chosen *female* visitors

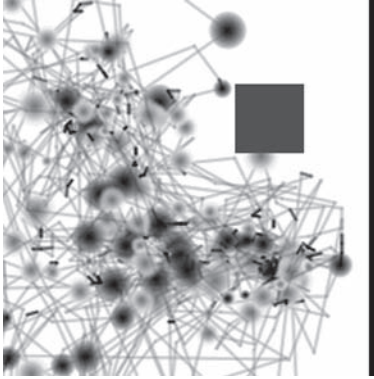


Figure 9b. Twenty-three randomly chosen *male* visitors

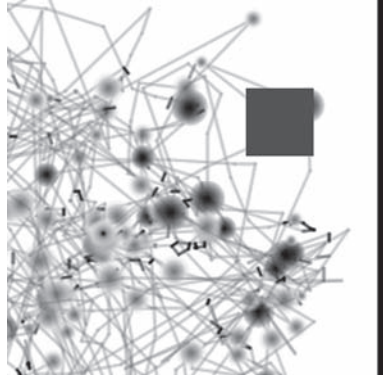


Figure 9c. Picture of Dieter Roth's *Doppelzweig*, 1969 (Place ID 59)

here). We did not find a difference in the visit durations of male and female visitors $F(528,1)=0.45$, $p=.501$.

Also when comparing the artworks in front of which the visitors spent the most time, no substantial variances could be found.³³ These findings are supported by the studies of Smith and Smith³⁴ and Imamoğlu and Yılmazsoy³⁵; in both studies no correlation of viewing time and gender were found.

In order to conduct further analyses, we investigated the *average time spent in front of the individual artworks and wall texts*. We therefore defined an "affective space" for each work of the exhibition, depending on how close a viewer

Paths and physiological reactions of:

Figure 10a. Twenty-three randomly chosen *female* visitors

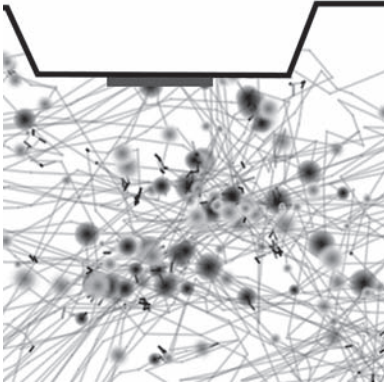


Figure 10b. Twenty-three randomly chosen *male* visitors

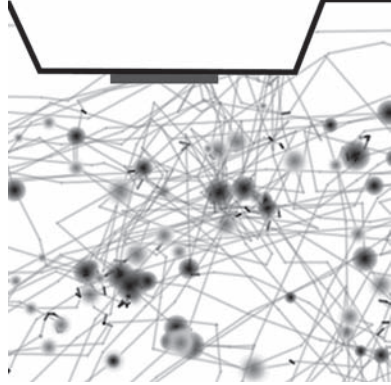


Figure 10c. In front, Ingrid Calame, *Lup-bup Zhir-Pow!* 1994/1997 (Place ID 72)



had to approach the work to observe it. Art experts, including the museum director and the curator, were responsible for the “affective space” definitions. In the figure below, the affective space of an artwork, its “region,” is depicted as a light-gray field. Depending on the average time spent in the region by all individuals of the respective subgroup, the region is displayed in lighter to darker gray. The region with the highest average visit duration (approximately thirty-five seconds) in both visitor groups is portrayed by the darkest rectangle and was the region of Günter Uecker’s *Antibild*.

The following two figures, 11a and 11b, allow for a visual comparison of the viewing time of sixty-seven male visitors and 113 women in the same time period.³⁶

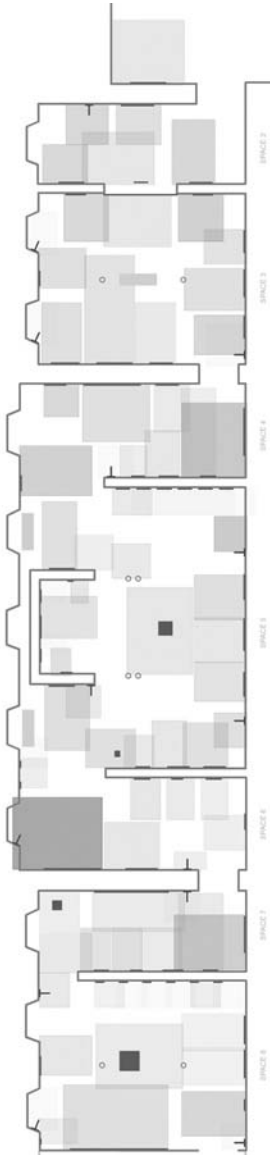


Figure 11a. Average viewing duration of sixty-seven male visitors



Figure 11b. Average viewing duration of 113 female visitors

One can recognize the ground floor, indicated by the black line, the artworks depicted by dark gray rectangles and squares, and the information text portrayed by the dark gray "T"s (see also Figure 1). In front of each artwork and information text, the "regions" in their varying transparency, indicating the average viewing time, are visible.

By analyzing Figures 11a and 11b, it becomes obvious that men and women looked at nearly the same number of artworks. There are not any “regions” that are transparent. Furthermore, they spent the most time in front of the same works *Antibild* (Place ID 47), *Fantasia coloristica* (Place ID 16), *Exterminator* (Place ID 53), and *Forêt—Lune* (Place ID 23). Even so, one difference of the two groups is noteworthy: women read more information texts. They read thirteen out of fourteen, but men only seven! This phenomenon is especially visible in the Spaces 2, 3, and 4. Here, the women read all of the four texts, whereas men only read the first one.

Close-up T 108

Already in Figures 4a and 4b, one could see differences in the physiological reactions of men and women in front of the information text T 101. Comparing all the information texts and the arousal levels that they caused, the most remarkable difference between the two sexes can be found in information text T 108. This text articulates the story of the female artist Madeleine Kemeny-Szemere:

Madeleine Kemeny was born in Budapest in 1906 under the name of Lenke Szemere. It was in this same city where she studied at the Arts Academy and had a first taste of success as an artist. In 1930, she immigrated to Paris where she worked as a fashion designer and got to know the Hungarian artist Zoltan Kemeny (1907–65), whom she married in 1933. From 1938 onward, both of them worked for the Swiss fashion magazine *Annabelle*. Before the occupation of France by the National Socialists, the Jewish couple fled to Switzerland in 1940 and were interned. While Zoltan Kemeny was released after a short time and received a work permit, Madeleine Kemeny remained interned until the end of the war. It was not until 1945 that she could rejoin her husband in Zürich, where they settled.

In 1946, Madeleine und Zoltan Kemeny returned to Paris for the first time. They met the artist Jean Dubuffet whose oeuvre deeply impressed them. At the same time, the Dubuffet supported Madeleine’s artistic practice wholeheartedly. Together with the artist collective COBRA, Madeleine Kemeny took part in international exhibitions, before deciding to stop her own artistic career in 1956 in favor of her husband, who, in the meantime, had become a successful artist.

[After] her husband’s death, Madeleine Kemeny took care of the estate by donating larger groups of works to important museums such as the Musée d’Art Moderne de la Ville de Paris. She has also donated several of her husband’s important early paintings and sculptures to the museum of fine arts St. Gallen since 1987. After her death in 1993, Béatrice Langraf has administered the estate and substantially complemented the former donations in the context of a retrospective on Madeleine Kemeny’s artistic practice. It was via this initiative that

Paths and physiological reactions of:

Figure 12a. Twenty-three randomly chosen *female* visitors



Figure 12b. Twenty-three randomly chosen *male* visitors

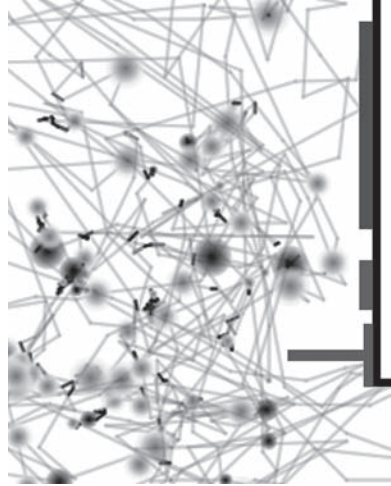


Figure 12c. A female visitor with data glove reading Text 108 about Madeleine Kemeny-Szemere; on the left, the artwork *Filettes en luge* (Place ID 72) by Madeleine Kemeny-Szemere

the entire estate was given to St. Gallen. . . . The documentation of her once wholly underestimated oeuvre could finally be carried out and brought to public attention.

In the comparison of Figures 12a and 12b, the strong arousal the text caused and its holding power on female visitors becomes apparent.

Although women read nearly twice as many text panels as men, they did not show such an obvious physiological reaction in front of any other text panel in the exhibition. This could be explained by the fact that the other text panels primarily described the stories of one or several collectors more factually and that such biographies were less moving.

Analysis IV: Results of the Post-Visit Survey

Another pivotal part of this multimethod study was the carrying out of a post-visit survey, an online survey completed three to six weeks after the visit to the exhibition.³⁷ One of the advantages of the post-visit survey was the opportunity for the surveyed visitors to answer a few open questions. The first questions prompted the respondent to answer in his or her own words about topics that each remembered from the visit experience.

(a) Your visit to the exhibition *Eleven Collections and Three Donations for One Museum* now dates back about three weeks. First of all, we are interested in what you remember very spontaneously to be most noteworthy about this visit. These memories do not necessarily need to be recollections of the exhibited artworks; instead, they may be memories of something completely different. Please write down a maximum of three recollections (each of them with a maximum of 350 characters).

(b) Which artworks can you remember more clearly? Please name a maximum of three works that you remember best.

General Memory

A total of seventy-seven visitors answered our request to click on a specific website to answer an online questionnaire about their memories on the exhibition visit. Sixty-three percent of these respondents were women, 37 percent men. This mirrors the overall proportion of participants in the project with 62 percent women and 38 percent men. However, one has to take into account that the following results are based on a rather small number of respondents.

Looking at the respondent distribution among all categories of memories by sex (categories were artist; artworks; staging/curating; being emotionally moved; the eMotion-Project; about the context in general), there are no significant variances to be found ($\chi^2 = 33,86$, sig. = .378). Different from this general finding, for the specific memory category "being emotionally moved," the proportion of women is slightly higher than the proportion of men (22:78 percent).

"Which artworks can you remember more clearly?"

In the second question of the post-visit survey about items remembered, we investigated the recollected artworks. Of the seventy-seven visitors answer-

Table 4. Exhibited artworks remembered

		Male	Female	Total
<i>Palazzo Contarini</i> , 1908	n	11	16	27
Claude Monet		41%	59%	
<i>Antibild, Räumliche Struktur</i> , 1974	n	10	10	20
Günther Uecker		50%	50%	
<i>Campbell's Condensed Tomato Soup</i> , 1962	n	7	10	17
Andy Warhol		41%	59%	
<i>Entre Lys et defense</i> , 1958	n	5	5	10
Hans Arp		50%	50%	
<i>A Label Level</i> , 2009	n	8	2	10
Nedko Solakov		80%	20%	
<i>Selbstbildnis</i> , 1917	n	2	6	8
Ferdinand Hodler		25%	75%	
<i>Doppelzweig</i> , 1969	n	4	4	8
Dieter Roth		50%	50%	
<i>Linienherrlichkeit, III</i> , 1909	n	4	3	7
Ferdinand Hodler		57%	43%	
<i>Treibriemen-Skulptur</i> , 1989	n	4	2	6
Thomas Virnich		67%	33%	
<i>Neubau, 1913.171</i> , 1913	n	0	6	6
Paul Klee		0	100%	
<i>Portrait Zaccaria Giacometti</i> , 1893	n	3	2	5
Giovanni Giacometti		60%	40%	
Total	n	25	43	68
		37%	67%	

ing the post-visit survey, only a few continued to remember the exhibited artworks. Table 4 shows the artworks that were recalled most often (count of responses, not cases).

All in all, remembering the different works by sex is balanced among the recalled artworks ($\chi^2 = 23,25$, $\text{sig.} = .563$). However, there were a few interesting exceptions to this rule. For instance, the same number of men and women recollected the artworks *Antibild*, *Entre Lys et Défense*, and *Doppelzweig*, although the proportion of the visitors was 38 percent male and 62 percent female. For the recollection of the large-sized, spatially dominating work *Linienherrlichkeit*, the proportion is even—57:43 (male:female)—compared to the visit proportion of 37:63. Also *Treibriemen-Skulptur* and the intervention *A Label Level*, 2009, were remembered predominantly by men. All of these works are somehow spatially dominating. Only one work, the *Portrait Zaccaria Giacometti*, which was also recollected more by men (60:40), does not seem to fit into this category.

Neubau, 1913.171, a drawing by Paul Klee, was, in particular, remembered by only women. Of all the seventy-six people, only six visitors still remembered this work, all of them were women. An explanation for this might be

that all the labels for the five works (Place ID 35–39) authored by Paul Klee were positioned to the right, directly beside *Neubau, 1913.171* (Place ID 35). Considering women tend to read more text, their attention was drawn to this artwork; they did not recall any of the other four artworks by Paul Klee.

Discussion

On the level of *expectations*, we found that, for women, it is more important to improve their understanding of fine arts, as well as to be part of the exhibition with all their senses. Women also expected to experience beauty. It was also found that the presentation of and information about the artworks were highly important for women.

On the level of *experiences*, we found that artworks were evaluated more positively by women generally, especially the content/topic of the artworks, the composition of the artworks, the artist, the importance of the artwork in art history, the presentation of the artwork and its connection to the other artworks of the exhibition. Also, the emotional assessments were partially sex specific. Women were more often emotionally moved, and they were experiencing the artworks as “strong” more often. Men showed more negative emotional reactions, such as sadness and fear. These subjective assessments of the surveys could again be found in the *objective data* of their museum visits. The female visitors read almost twice as many text panels than male visitors, and they also showed a much more pronounced affected state while reading.

Moreover, for about 10 percent of the artworks, we could find considerably different physiological reactions and behavioral patterns in front of the artworks. Female visitors were especially affected by the artworks *Selbstbildnis* (Ferdinand Hodler), *Nr. 43* (Max Bill), *Doppelzweig* (Dieter Roth), *Campbell's Condensed Tomato Soup* (Andy Warhol), and *Lup-bup Zhir-Pow!* (Ingrid Calame). Male visitors, instead, showed clearly more physiological reactions in front of *A Label Level* (Nedko Solakov) and *Portrait Zaccaria Giacometti* (Giovanni Giacometti).

Furthermore, in the *post-visit online survey* women remembered more often the artworks *Bild mit Glühlämpchen* (James Rosenquist), *Selbstbildnis* (Ferdinand Hodler), and *Neubau, 1913.171* (Paul Klee), but significantly fewer *A Label Level* (Nedko Solakov) and *Treibriemen-Skulptur* (Thomas Virnich). Also, in the post-visit survey, the item “emotionality” was significant, women remembered emotional moments more frequently in the exhibition than men.

CONCLUDING

In respect to the different emotional reactions in front of the text panels about Madeleine Kemeny-Szemere and the *Portrait Zaccaria Giacometti*, we

might say that works or texts attracted men and women, especially when dealing with their own sex. Men look at male portraits and remember them; women are aroused by stories of other women. Both sexes are interested in self-actualization.

In respect to the differing expectations and also the differing experiences of men and women, it seems to be consistent that women were more affected by Ferdinand Hodler's *Selbstbildnis* because of its specific curatorial setting. A similar conjunction could be concluded between the self-assessment of the factor "composition of the artworks" and the making of the artworks *Bild mit Glühlämpchen*, *Doppelzweig*, *Campbell's Condensed Tomato Soup*, and *Lup-bup Zhir-Pow!*

However, no such association could be found with regard to the self-assessments in the surveys of men and their physiological arousal and/or the recollection of the work *A Label Level*. We can explain this finding only in retrospect, reflecting on the artworks themselves. Although Solakov's work is small, it is a powerful intervention in the exhibition. He took the freedom to comment on any work he wanted to comment on, at times even in a rough manner. This invasive, tagging strategy to attract attention may be described as a male strategy. Therefore, as an act of self-actualization, it might have caused more arousal in men and, thus, be more often remembered by them. Even if this last explanation of the work *A Label Level* is rather vague, it is nonetheless remarkable how many of those differences between male and female art reception, coupled with their respective expectations, their recollections, and also with their embodied reactions, could be found and how little we know about them. In hindsight to the expectation, experiences, and the behavior of the museum visitors, we might conclude that sex makes a difference when it comes to art.

Notes

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26. Tröndle and Tschacher, "Physiology of Phenomenology"; Tschacher et al., "Physiological Correlates."
27. For details, see Tschacher et al., "Physiological Correlates."
28. Tröndle et al., "The Entanglement of Arts and Sciences: On the Transaction Costs of Transdisciplinary Research Settings," *Journal for Artistic Research* 1 (2011), accessed August 5, 2013. <http://www.jar-online.net/>.
29. Tröndle and Tschacher, "Physiology of Phenomenology."
30. Ibid.
31. On the effects of curatorial settings, also see Tröndle et al., "Affective Effects," forthcoming.
32. For a detailed analysis of the intervention's effects, see Martin Tröndle, Stéphanie Wintzerith, Wolfgang Tschacher, Karen van den Berg and Volker Kirchberg, "Is This Art? A Field Study on the Decision Art/Non-Art of Fine Art Museum Visitors," *Cultural Sociology*, 2013, 1–24, doi: 10.1177/1749975513507243.
33. Table 5. Average viewing time of artworks, longest viewing time.

	Place ID	Average viewing time per visit: Men	Average viewing time per visit: Women
<i>Antibild, Räumliche Struktur</i> , 1974, Günther Uecker	47	35.6 sec	34.7 sec
<i>Fantasia Coloristica</i> , 1913, Augusto Giacometti	16	20.5 sec	22.4 sec
<i>Exterminator</i> , 1968, Peter Phillips	53	18.9 sec	18.7 sec
<i>Forêt—Lune</i> , 1924, Max Ernst	23	18.1 sec	18.6 sec

34. Smith and Smith, "Spending Time on Art."
35. Imamoğlu and Yilmazsoy, "Gender and Locality-Related Differences."
36. To reduce passer-by effects, only visits with a duration of more than three seconds were counted as a visit and included into the definition of a "region." To raise the validity of the instrument, only those regions that were visited ten times or more are displayed in the figure.
37. This online questionnaire was made available to visitors who, at the exit of the exhibition and on a voluntary basis, agreed to participate in the survey and provided us with their email address. These visitors were reminded of the online-survey via email.

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