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Two Routes to Aesthetic Preference, One Route to Aesthetic Inference

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Aesthetic preferences vary strongly between people. Yet, it can be essential to infer what other people aesthetically prefer. Therefore, we investigated lay people's ability to infer aesthetic preferences and the involved processes. Because aesthetic preference depends on affective as well as cognitive processes, we asked 40 participants to rate 24 artworks on the dimensions Positive Attraction, Cognitive Stimulation, and Emotionality. Additionally, participants had to infer other people's judgments concerning the same stimuli and dimensions. In the self-assessment, Positive Attraction correlated strongly with Emotionality as well as with Cognitive Stimulation, whereas in the other-assessment, Positive Attraction correlated only with Emotionality. An interassessment correlation revealed that about half of the participants produced a significant medium to high correlation between their other assessments and the mean others′ self-assessment, depending on the respective dimension. Thus, our results indicate that many individuals are able to infer aesthetic preferences, and that preferences for artworks are inferred primarily via affective stimulus appraisal.

Keywords: aesthetics, judgment, preference, inference, beauty

Aesthetic preferences differ considerably across people, which holds more for fine and applied arts, such as paintings and architecture, than for natural objects, such as faces and landscapes (Leder, Goller, Rigotti, & Forster, 2016; Vessel, Maurer, Denker, & Starr, 2018). Differences in aesthetic preferences largely depend on the individuals′ cultural background (Bao et al., 2016; Masuda, Gonzalez, Kwan, & Nisbett, 2008; Nisbett & Masuda, 2003), vary with personality (Chamorro-Premuzic, Reimers, Hsu, & Ahmetoglu, 2009; Myszkowski & Zenasni, 2016), gender and age (Little, Caldwell, Jones, & DeBruine, 2015), expertise (Augustin & Leder, 2006; Palmer & Griscom, 2013), as well as with environment and personal experiences (Cooper & Maurer, 2008; Germine et al., 2015).

Despite those individual differences, various industry sectors try to predict which products a majority of people aesthetically prefer (Hoyer & Stokburger-Sauer, 2012; Patrick & Peracchio, 2010). Many creatives working in these sectors are successful in inferring consumers' preferences and thereby even shape taste (Carbon, 2011; Hekkert, Snelders, & van Wieringen, 2003). Hekkert and Leder (2008) point out that an understanding of general aesthetic principles as well as the awareness of other people's aesthetic preferences help creatives to fulfill this task.

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The aim of the present study was to investigate lay people's ability to infer aesthetic preferences of others. Also, for noncreatives it is of importance to assess aesthetic preferences: for instance, to buy gifts, to decorate a public place (e.g., with artworks), to cater a party, and so forth. Hence, lay people's ability to infer aesthetic preferences of others might be crucial for starting, maintaining, and improving social relations in everyday life (Redies, 2015).

As far as we are aware, the ability to infer other people's preferences has been investigated, until now, only in the context of strategic interactions. Human preferences and beliefs about other people's preferences have been successfully modeled to investigate strategic multiagent decision making (Ficici & Pfeffer, 2008). The ability to learn another person's preference from observed behavior was recently denoted as "theory of preferences" (Robalino & Robson, 2016) and is understood as an aspect and specific application of the theory of mind (ToM; Premack & Woodruff, 1978). The ToM is concerned with the understanding that others have intentions, desires, beliefs, perceptions, and emotions, which may differ from personal one's and that people's actions and behaviors are affected by these factors (*APA Dictionary of Psychology*; VandenBos, 2015).

The ability to infer the aesthetic preferences of others can be considered as a subcategory of general ToM abilities and should build upon the understanding that other people have other taste. Consequently, we will name the ability to think of and infer others′ aesthetic preferences "theory of aesthetic preferences" (TAP).

Besides investigating TAP, we intended to examine how people come to their conclusions about other people's aesthetic preferences. Considering aesthetic preferences, it has been stated that aesthetic experience results in an affective as well as a cognitive state (Leder, Belke, Oeberst, & Augustin, 2004; Leder & Nadal, 2014), and that both states influence the formation of personal aesthetic preferences (Graf & Landwehr, 2017). Similar ideas have been expressed in so-called dual-process models. Redies (2015), for instance, assumes a fast, bottom-up beauty-response mechanism, which is considered to be a universal human ability due to perceptual processing, and a slower, top-down cognitive processing mechanism, which is utterly linked to the subject and her cultural background. Hence, aesthetic preference seems to be a socially and culturally constructed individual attribute (Hanquinet, Roose, & Savage, 2014; Woodward & Emmison, 2001) based on innate cognitive as well as affective stimulus response mechanisms.

At present, there are no theoretical considerations regarding aesthetic inference. In this study, we investigate in which way the assessment of others′ affective as well as cognitive states relates to inferences about other people's aesthetic preferences.

In view of the evidence provided so far, we expect that participants are able to infer others' aesthetic preferences, despite the low agreement of preferences for artworks across observers (Vessel et al., 2018). This ability might yet be bound to a shared cultural background. To investigate aesthetic inference abilities as well as the underlying processes (affective and/or cognitive stimulus appraisal), we designed the present two-assessment study.

In a first self-assessment, participants rated a divers set of 24 pictures of paintings (Chatterjee, Widick, Sternschein, Smith, & Bromberger, 2010) on three dimensions: Cognitive Stimulation, Emotionality, and Positive Attraction, corresponding to the Art Reception Survey (ARS) by Hager, Hagemann, Danner, and Schankin (2012). We complied with the ARS, since it was constructed to analyze the factor structure of aesthetic experience, which involves cognitive involvement, positive and negative affective appraisal, but also self-referential aspects, judgments about the artistic quality and creativity, and information about knowledge and comprehension of the artwork.

The self-assessment was conducted to receive information about our participants′ own aesthetic preferences. Preferences were measured as beauty judgments on the Positive Attraction dimension (judgments of beauty and preference are considered to be related: see, for instance, Reber, 2012), whereas the underlying preference formation processes were measured as affective and cognitive stimulus appraisal on the Emotionality and Cognitive Stimulation dimensions, respectively.

In a subsequent other-assessment, participants had to rate the same artworks on the three dimensions from the perspective of "most other people," which allowed us to assess participants′ inference abilities as well as the underlying inference processes and to compare these results with those from the self-assessment. The order of the assessments was thoughtfully chosen. We assumed participants would form their own judgments about the artworks first, to use them as anchors for judging other people's taste (Epley, Keysar, Van Boven, & Gilovich, 2004).

Regarding the self-assessment, we expected that judgments of aesthetic preference would correlate with affective appraisal as well as with cognitive appraisal of the images. Yet, we assumed that positive affective appraisal of an artwork might lead to an increased beauty judgment compared with cognitive appraisal of the same piece (Graf & Landwehr, 2017). In the other-assessment, participants had to reason about other people's cognitive as well as affective attitudes toward the images and to infer other's aesthetic preferences, respectively. From a theoretical perspective, it was not clear how inferences of aesthetic preference and inferences of affective or cognitive stimulus appraisal would correlate.

Materials and Method

Participants

Forty students (28 female, M_{age} = 22.5, *SD* 4.0) from the University of Konstanz were recruited via an online recruiting system (Greiner, 2015). Sample size was determined by conducting a power analysis in G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), which revealed that for an effect size of 0.5 to be detected by 80% chance with significance at the 5% level, for a dependent *t* test a sample of 27 participants would be required, for a point biserial correlation a sample of 21 participants would be required, and for a multiple linear regression analysis with an effect size of 0.3 a sample of 36 participants would be required. We chose a conservative sample of 40 participants, in case of any dropouts.

Participants were compensated with a 4-€ Amazon voucher. The study was performed in accordance with the ethical standards of the 1964 Declaration of Helsinki and its later amendments (World Medical Association, 2013) and with the ethics and safety guidelines of the University of Konstanz. Participants were informed of their right to abstain from participation in the study or to withdraw consent to participate at any time without reprisal.

Stimuli

A set of 24 pictures of diverse paintings (Table 1) served as stimuli, which were taken from the Assessment of Art Attributes, an instrument developed by Chatterjee et al. (2010) to assess six formal-perceptual and six conceptual-representational art attributes. The 24 artworks from western art history, ranging from the 11th century to the mid-20th century, vary broadly in style and genre. Given the great variability of preferences for artworks (Leder et al., 2016; Vessel et al., 2018), we assumed that, using this diverse stimulus set, participants could well indicate some artworks as preferred over others.

Procedure

Participants were sent a link to the online survey platform SoSci Survey (https://www.soscisurvey.de), where they first gave sociodemographic information as well as information about their art expertise. Art expertise was assessed by asking participants (a) whether they had a professional qualification in fine or applied arts, art history, or art theory; (b) how often they visited art exhibitions, galleries, or museums; and (c) how often they informed themselves about art in print and online media.

The following experiment lasted for approximately 15–20 min (there was no time limit) and was split into two parts.

In the first part, participants had to answer three questions per picture concerning their own aesthetic preferences. We used items according to the ARS of Hager et al. (2012): (a) Positive Attraction dimension ("this painting is beautiful"), (b) Cognitive Stimulation dimension ("this painting is thought-provoking"), and (c) Emotionality dimension ("This painting causes emotions"). Partici-

Table 1
Mean Self and Other Ratings (Averaged Across Participants) for Each Picture and Dimension, Respectively

	Positive Attraction		Emotionality		Cognitive Stimulation	
Pictures	Self	Other	Self	Other	Self	Other
Pieter Bruegel de Elder, *Netherlandish Proverbs*, 1559	53.5	51.0	−10.0	−10.2	62.2	64.9
Mary Cassatt, *On the Balcony During Carnival*, 1873	55.2	66.0	7.48	19.2	50.5	57.5
Mary Cassatt, *Self Portrait*, 1880	50.6	60.4	−4.45	1.15	47.7	57.7
Paul Cezanne, *Still Life with Kettle*, 1869	44.5	49.3	−3.83	−5.55	32.6	41.2
Salvador Dali, *Dream Caused by the Flight of a Bee Around a Pomegranate a Second Before Awakening*, 1944	59.5	51.9	.83	−4.33	72.6	78.3
Willem de Kooning, *Woman I*, 1952	22.6	30.5	−18.3	−14.3	43.4	53.4
Thomas Dewing, *The Piano*, 1891	58.7	71.8	13.8	20.6	44.4	51
Duccio di Buoninsegna, *Maestà*, 1311	38.0	58.0	−7.63	9.43	42.6	55.2
Thomas Eakins, *The Gross Clinic*, 1875	44.9	43.1	−13.7	−15.3	63.9	67.8
Stephanus Garsia, *Apocalypse of Saint-Server*, 11th century	39.4	52.0	−4.70	4.93	52.3	57.1
Willem Heda, *Still Life with Oysters, Rum Glass, and Silver Cup*, 1635	45.2	48.2	−15.0	−14.8	50.4	48.8
Robert Henri, *Laughing Child*, 1907	40.0	59.1	4.43	15.83	40.4	54.3
Edward Hopper, *Gas*, 1940	72.3	63.0	12.5	10.1	57.2	54.3
Hans Holbein The Younger, *Portrait of Dirk Tybis*, 1533	48.3	50.2	−5.55	−8.88	47.0	50.2
Frida Kahlo, *Two Fridas*, 1933	43.1	37.33	−11.0	−17.8	71.4	75.5
Henri Matisse, *Seated Riffian*, 1913	39.1	48.7	−.73	4.33	41.1	52.8
Henri Matisse, *Zorah on the Terrace*, 1912	56.5	57.5	8.95	10.1	55.8	58.1
Barnett Newman, *Eve*, 1950	29.1	27.5	−8.60	−7.73	26.3	34.5
Pablo Picasso, *Nu couché à l'oiseau*, 1968	32.8	35.8	−1.01	−6.08	54.4	58.6
Camille Pissarro, *Landscape with Flooded Fields*, 1873	72.0	73.3	13.9	11.8	56.8	57.0
Jackson Pollock, *Number One*, 1948	55.0	46.7	−2.8	−3.63	49.5	50.6
Mark Rothko, *Red and Orange*, 1955	41.4	45.1	1.00	−1.45	27.7	35.8
Jan van Eyck, *Portrait of a Man*, 1433	50.7	48.3	−5.80	−3.73	45.0	51.1
Johannes Vermeer, *The Love Letter*, 1670	51.6	49.2	−6.75	−2.18	52.6	59.2
Mean	47.7	51.0	−2.38	−.35	49.5	55.2

Note. Positive Attraction and Cognitive Stimulation ratings were measured on a scale from 1 to 101. Emotionality ratings were measured on a scale from −50 to 50. Self = mean picture ratings from self-assessment; Other = mean picture ratings from other-assessment.

pants saw one picture with the three questions below at a time. Pictures as well as questions occurred in randomized order. Via mouse click on a continuous rating scale (from 1 to 101 for the Positive Attraction and the Cognitive Stimulation scales, and −50 to 50 on the Emotionality scales; numbers hidden to participants, see Treiblmaier & Filzmoser, 2011), participants could indicate their assessment from left = *not at all* to right = *very much* for the positive attraction and the cognitive stimulation dimension, and from left = *negative* to right = *positive* for the Emotionality dimension scale. After the 72 assessments (24 pictures × 3 questions), participants were instructed for the next part of the experiment. In this second part, participants had to infer aesthetic judgments of other people. Again, participants had to answer the three questions per picture concerning each dimension, but this time from the perspective of "most other people": (a) Positive Attraction dimension ("most people find this painting beautiful"), (b) Cognitive Stimulation dimension ("most people find this painting thought-provoking"), and (c) Emotionality dimension ("This painting causes emotions in most other people"). Again, the 24 pictures as well as the three associated questions occurred in randomized order.

Results

Lay People Versus Art Experts

The evaluation of our participant's art expertise questionnaire confirmed that we could consider our sample as art naïve. Thirty-eight of the 40 participants indicated that they were untrained in the arts, 37 participants stated that they visited art exhibitions and museums less than five times a year, and 39 participants informed themselves less than two hours a week about art in print and online media. Moreover, our assumption is also strongly supported by the correlations between our sample's data and Chatterjee et al.'s (2010) data of art-naïve and art-experienced participants.

We found a significant correlation between our sample's ratings for Cognitive Stimulation and those for interest from Chatterjee et al.'s (2010) art-naïve participants, $r(22) = .73$, $p < .001$, 95% CI [.46, .87], but no significant correlation with scores from art-experienced participants, $r(22) = .31$, $p = .14$, 95% CI [−.11, .63]. A similar result occurred for the relation between our sample's ratings of Positive Attraction and Chatterjee et al.'s (2010) samples′ ratings of preference. The correlation was significant for scores from art-naïve participants, $r(22) = .54$, $p < .01$, 95% CI [.17, .77], but not for those from art-experienced participants, $r(22) = -.08$, $p = .71$, 95% CI [−.47, .33].

Concerning emotionality, Chatterjee et al. (2010) measured the emotional content of the pictures, while we asked participants to indicate their own emotional responses toward the artworks. When correlating our participants' data with the averaged picture emotionality scores of Chatterjee et al.'s (2010) samples, the difference in constructs became apparent: there was no significant correlation, neither for art-naïve, $r(22) = .09$, $p = .68$, 95% CI [−.32, .48], nor art-experienced participants, $r = -.05$, $p = .78$, 95% CI [−.45, .35].

Averaged Data

In this section, we analyze the averaged data, before focusing on individual data in the subsequent section. This way, we are not only able to investigate picture-based results, but also to compare them with averaged individual results (Monin & Oppenheimer, 2005).

Comparison of self- and other-assessment. Our first interest was to evaluate main differences between self- and other-assessments for each dimension (see Table 1). Accordingly, we analyzed the picture-based ratings averaged across participants and calculated paired t tests for each dimension. A significant difference was found for Cognitive Stimulation, $t(23) = -6.49$, $p < .01$, $d = 0.52$, 95% CI [−7.54, −3.89], (self: $M = 49.5$, $SD = 11.8$, other: $M = 55.2$, $SD = 10.2$), but not for Emotionality, $t(23) = -1.65$, $p = .11$, $d = 0.20$, 95% CI [−4.57, .51], (self: $M = -2.38$, $SD = 8.93$, other: $M = -0.35$, $SD = 11.1$), and also not for Positive Attraction, $t(23) = -2.0$, $p = .06$, $d = 0.28$, 95% CI [−6.78, .12], (self: $M = 47.7$, $SD = 12.0$, other: $M = 51.0$, $SD = 11.6$).

While, on average, the pictures were considered more cognitively stimulating in the other-assessment than in the self-assessment, the respective picture scores of self- and other-assessment related strongest in the Cognitive Stimulation dimension: the highest significant correlation occurred for Cognitive Stimulation, $r(22) = .93$, $p < .001$, 95% CI [.85, .97]. Emotionality scores correlated with $r = .84$, $p < .001$, 95% CI [.67, .93], and Positive Attraction scores with $r = .76$, $p < .001$, 95% CI [.51, .89], as displayed in Figure 1.

Individual Data

Within-rater agreement. To investigate to what extent individuals' self-assessments (single self) agreed with their other-assessments (single other), we correlated both assessments′ scores for each participant and dimension, respectively. For Positive Attraction the average correlation across participants was $r = .53$, $SD = .20$, for Emotionality it was $r = .50$, $SD = .22$, and for Cognitive Stimulation it was $r = .50$, $SD = .20$.

Compared with the average data analysis, we found lower averaged individual correlations, but more homogenous results across dimensions (Figure 2). However, the ranges were very wide, indicating that some participants made almost the same judgments for others as for themselves, while some participants made very distinctive judgments for others compared with their self-assessments.

Rater-group agreement self-assessment. To investigate the diversity of aesthetic preferences for artworks, as previously proposed by Vessel et al. (2018), and Leder et al. (2016), we correlated each participant's self-assessment scores for each picture (single self) with the mean self-assessments scores for each picture from all other participants (group self: mean of all except the single participant). For Positive Attraction, the average correlation was .45 (SD .26), ranging from −.30 to .81, for Emotionality it was .39 (SD .20), ranging from −.27 to .78, and for Cognitive Stimulation it was .44 (SD .26), ranging from −.12 to .80 (Figure 3).

As further measure of rater-group agreement, we estimated the internal consistency across participants for each dimension by calculating Cronbach's alpha, where each participant was treated as an item (but see Hönekopp, 2006). For the Positive Attraction assessment, Cronbach's alpha was .88, for Emotionality .85, and for Cognitive Stimulation .88.

Rater-group agreement other-assessment. Diversity was also examined for the other-assessment. For this objective, we correlated each participants' other-assessment scores (single other) for each picture with the mean other-assessment scores for each picture from all other participants (group other: mean of all except the single participant). For Positive Attraction, the correlation was $r = .50$, $SD = .23$, for Emotionality, $r = .52$, $SD = .23$, and for Cognitive Stimulation, $r = .44$, $SD = .25$ (see Figure 3).

Concerning internal consistency (Cronbach's alpha), the estimates for Positive Attraction (.92), and Emotionality (.93) were

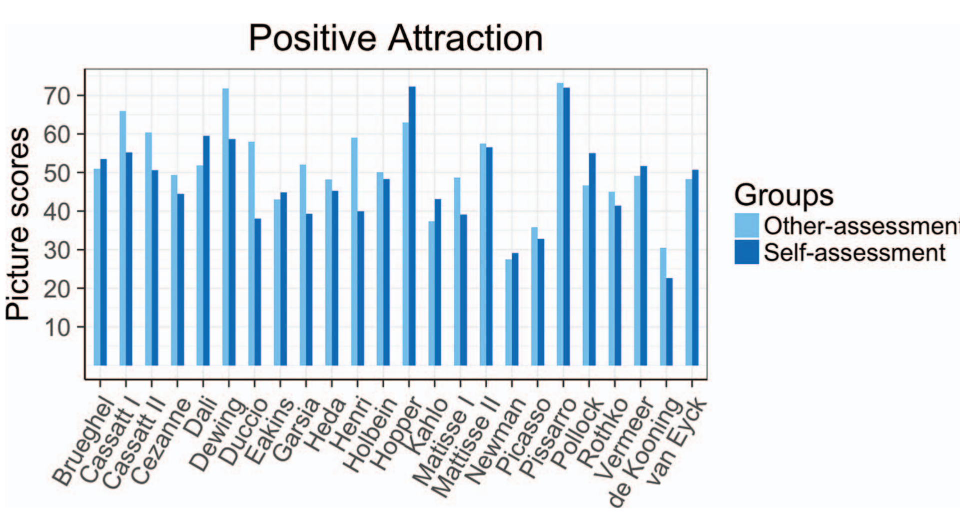

Figure 1. The bar plot shows the comparison of mean picture scores from self- and other-assessment for the Positive Attraction dimension. See the online article for the color version of this figure.

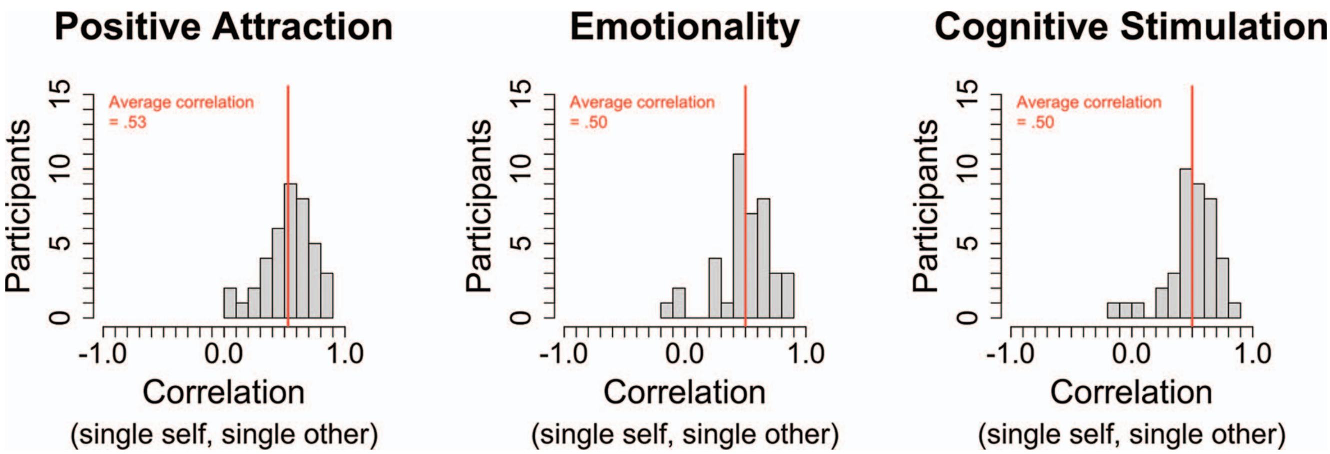

Figure 2. The three histograms show the distribution of the correlations between single self- and single other-assessment scores for the considered dimensions. The red lines present the average correlations. See the online article for the color version of this figure.

higher compared with those for the self-assessment. For Cognitive Stimulation (.88) the estimates were the same.

Relations Between Individual Self- and Other-Assessments per Dimension

As presented, the averaged rater-group agreement in the self- and other-assessment was similar for the dimension Positive Attraction (self-assessment: $r = .45$, other-assessment: $r = .50$) as well as for Cognitive Stimulation (self-assessment: $r = .44$, other-assessment: $r = .44$). However, there was a noticeable difference in the Emotionality dimension (see Figure 3). In the self-assessment, the averaged individual correlation was much lower ($r = .39$) compared with the averaged individual correlation in the other-assessment ($r = .52$). This suggests that participants had a more individualized emotional response to the artworks, but were more homogeneous, as a group, in their expectancies of how other people would emotionally appraise the artworks. Yet, the averaged within-rater agreement across dimensions was similar for all three dimensions (see Figure 2).

To investigate the relations between individual self- and other-assessments for each dimension, we correlated participants‘ mean self-assessment score with the respective mean other-assessment score. Significant correlations were found for the dimensions Positive Attraction, $r(38) = .59$, $p < .001$, 95% CI [.34, .76], as well as for Cognitive Stimulation, $r(38) = .60$, $p < .001$, 95% CI [.36, .77], but not for Emotionality, $r(38) = .28$, $p = .79$, 95% CI [−.03, .54]. The corresponding scatterplots and regression lines can be seen in Figure 4. These results show that other-assessments for Positive Attraction and Cognitive Stimulation can be predicted by the corresponding self-assessments. For Emotionality, however, this is not the case.

Individual Inference Abilities

To investigate to what extent our participants were able to infer group assessments, we also correlated for each dimension the individual other-assessment scores (single other) with the mean group self-assessment scores (group self: mean of all except the single participant). Here, the highest averaged individual correlation was found for the Emotionality dimension, $r = .42$, $SD = .20$, [−.20, .71]. The correlation was less for Cognitive Stimulation, $r = .39$, $SD = .26$, [−.10, .78], and least for Positive Attraction, $r = .36$, $SD = .22$, [−.17, .71].

As can be seen in Figure 5, the individual correlations differ largely. If we take into account that correlations larger than .41 are statistically significant ($\alpha = .05$.), then we can conclude that, according to this criterion, 22 of our 40 participants (55%) were able to infer the Emotionality ratings of others, 19 participants (47.5%) were able to infer the cognitive stimulation of others, and 17 participants (42.5%) could reliably infer to what extent other people found the presented artworks beautiful.

The ability to infer the aesthetic assessments of others is especially respectable, if the judgments are independent of the person's own aesthetic taste. Therefore, we plotted the values of the individual correlations between single other and group self against the individual correlations between single other and single self (Figure 6). The correlations are significant if they are greater than .40. In Figure 6, where the two significance thresholds are represented by the two corresponding dashed lines, it can be seen that at least some participants were able to infer others' judgments independently of their own aesthetic ratings, which is the case especially for the Emotionality dimension.

Relations Between Dimensions

Up to now, we have mainly considered our data in a descriptive way. In this section, we will focus on the relations between the three assessed dimensions. First, we consider the relations within the self-assessments, before we analyze the relations within the other-assessments.

Self-assessment. To investigate the relations between the assessed dimensions, we first correlated the mean picture scores (see Table 1) of all dimensions. We found that Positive Attraction correlated significantly with Emotionality, $r(22) = .67$, $p < .001$, 95% CI [.37, .85], as well as with Cognitive Stimulation, $r(22) = .45$, $p = .03$, 95% CI [.05, .72]. Emotionality and Cognitive

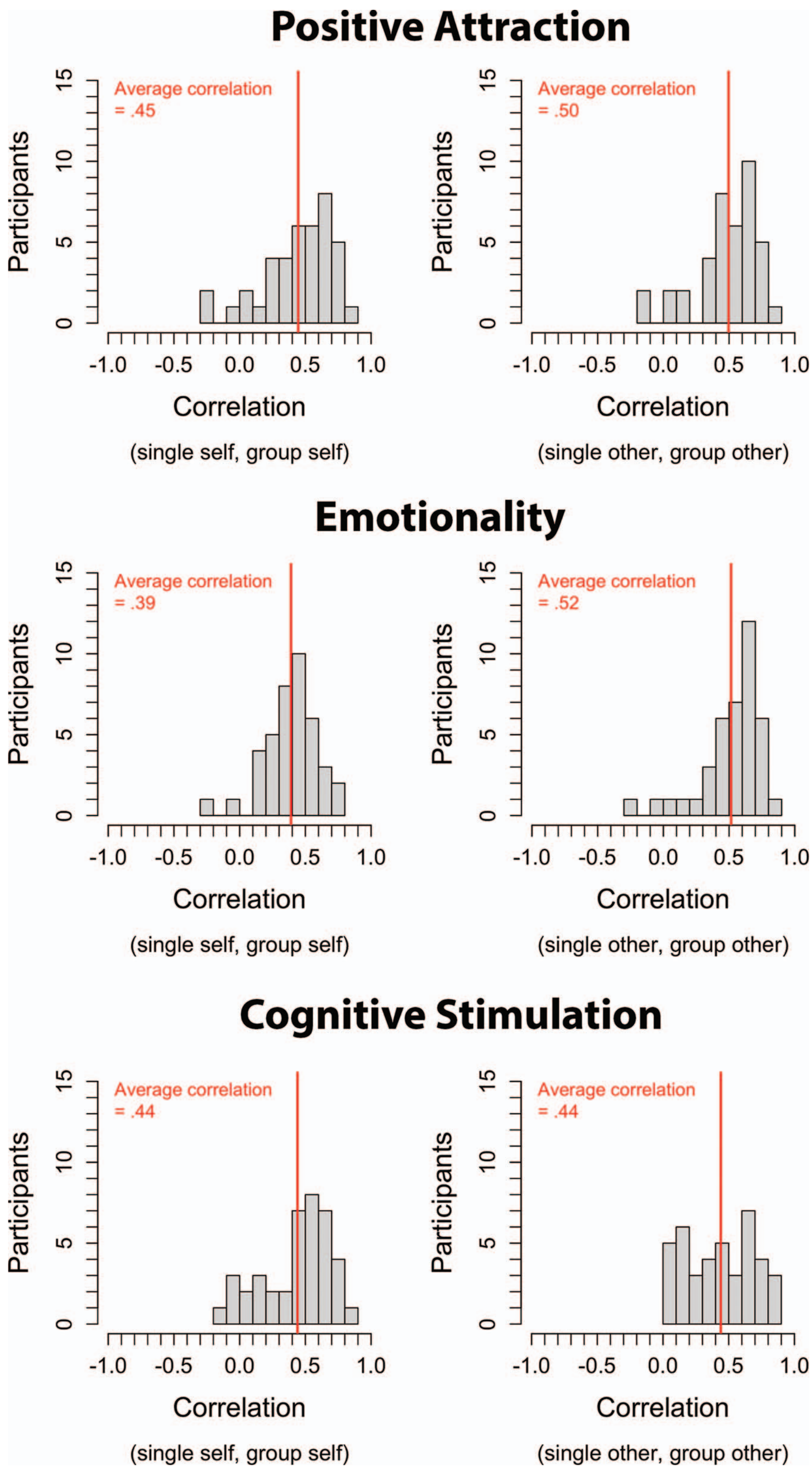

Figure 3. The three histograms on the left side show the distributions of the individual correlations between the single self-assessments and the mean group self-assessment scores respectively, for the dimensions Positive Attraction, Emotionality, and Cognitive Stimulation. The red lines present the average correlations. The histograms on the right side present the corresponding distributions of the individual correlations between single other-assessment and the mean group other-assessment scores. See the online article for the color version of this figure.

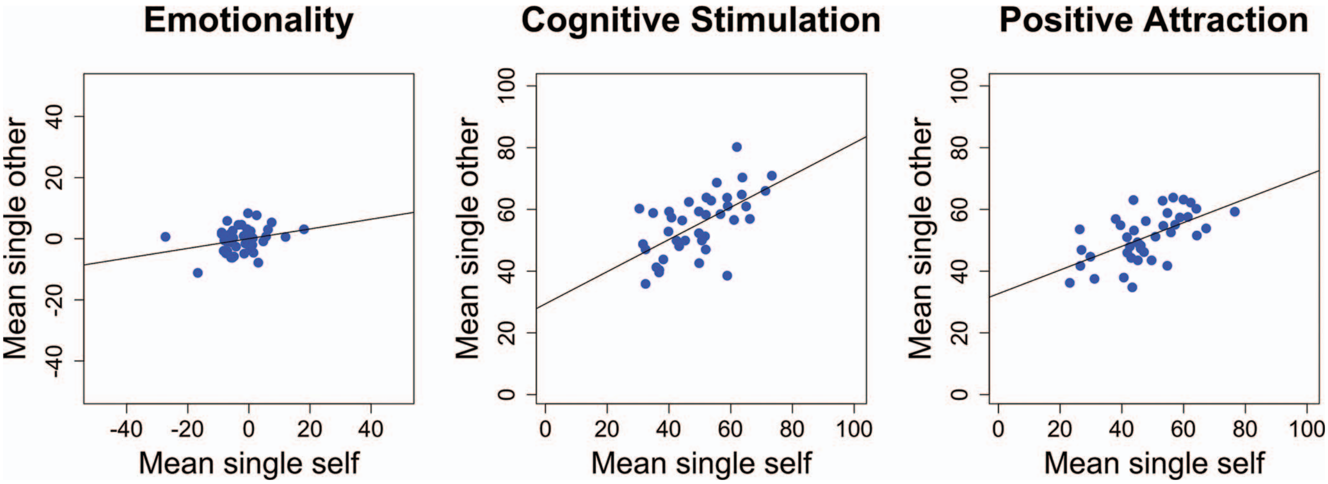

Figure 4. The scatterplots show the relations between participants′ mean self-assessment and mean other-assessment scores for the three dimensions, and the corresponding regression lines. See the online article for the color version of this figure.

Stimulation did not correlate significantly, $r(22) = .005$, $p = .98$, 95% CI [−.40, .41], as displayed in Figure 7.

A multiple-regression analysis revealed that Positive Attraction depends on both Emotionality and Cognitive Stimulation, $F(2, 21) = 19.8$, $p < .001$, $f^2 = 1.86$, $R^2 = .65$. Both predictor variables together explain 65% of the variance (Table 2). Yet, Emotionality predicts about twice as much variance in Positive Attraction compared with Cognitive Stimulation, although both are significant predictors.

The correlations between the dimensions found with the averaged data are also reflected by the individual correlations, even though in an attenuated form (see for the distinction between correlation of averaged data and averaged correlation across individual data, Monin & Oppenheimer, 2005). The mean individual correlation between Positive Attraction and Emotionality was high, $r = .55$, $SD = .20$, 95% CI [.09, .86], that between Positive Attraction and Cognitive Stimulation was moderate, $r = .45$, $SD = .29$, 95% CI [−.10, .88], and that between Cognitive Stimulation and Emotionality was low, $r = .23$, $SD = .33$, 95% CI [−.57, .84]; see Figure 7.

Other-assessment. Analogous to the self-assessment analysis, we also correlated the mean picture scores (see Table 1) for the other-assessments (Figure 8). As a result, there was a highly significant correlation between Positive Attraction and Emotionality, $r(22) = .81$, $p < .001$, 95% CI [.60, .91]. In contrast, Positive Attraction and Cognitive Stimulation did not correlate significantly, $r(22) = .12$, $p = .59$, 95% CI [−.30, .50], as did Cognitive Stimulation and Emotionality, $r(22) = −.13$, $p = .55$, 95% CI [−.50, .29].

A multiple regression analysis revealed that Cognitive Stimulation and Emotionality accounted for 70% of the variance in positive attraction judgments, $F(2, 21) = 24.5$, $p < .001$, $f^2 = 2.33$, $R^2 = .70$. However, only Emotionality is a significant predictor of Positive Attraction (Table 3).

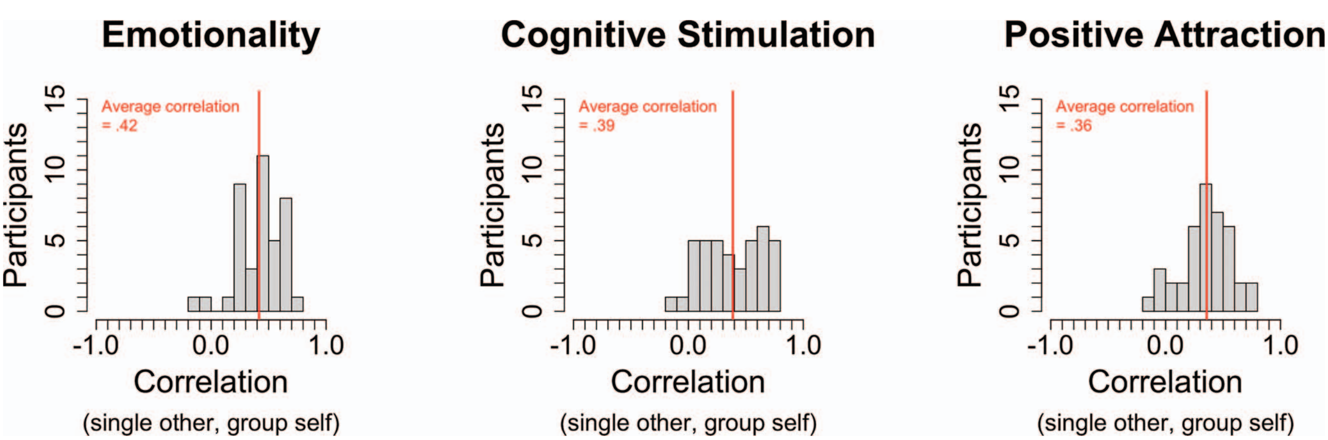

Figure 5. The histograms show the distribution of the individual correlations between single other-assessments and the mean group self-assessment scores, respectively, for the considered dimensions. The red lines present the average correlations. See the online article for the color version of this figure.

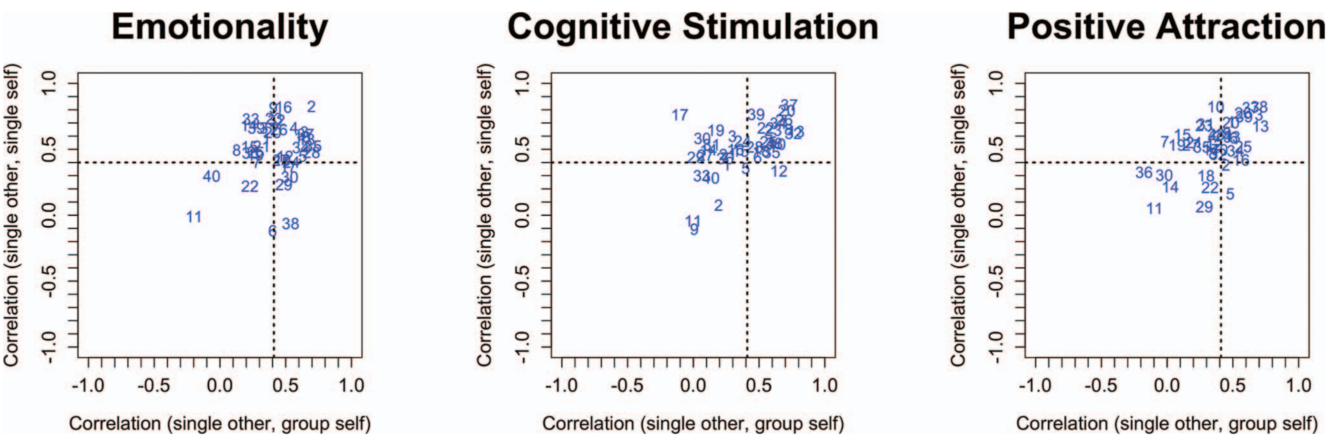

Figure 6. In these graphs the individual correlations between single other and group self-assessments (*x* axis) are plotted against the individual correlations between single other and single self-assessments (*y* axis). The dashed lines represent the 5% significance thresholds of the correlations. See the online article for the color version of this figure.

In the other-assessment, the mean individual correlation between Positive Attraction and Emotionality was high, $r = .59$, *SD* .19, 95% CI [.10, .97], whereas that between Positive Attraction and Cognitive Stimulation was low, $r = .27$, *SD* .33, 95% CI [−.34, .96], and that between Cognitive Stimulation and Emotionality very low, $r = .07$, *SD* .35, 95% CI [−.39, .91] (see Figure 8). Although the averaged individual correlations were lower than those between the corresponding average data analysis, they again show a similar pattern.

Together, our analyzes revealed that in self-assessment, Positive Attraction correlated significantly with Cognitive Stimulation as well as with Emotionality, whereas in the other-assessment Positive Attraction correlated significantly only with Emotionality. The same pattern occurred for the individual correlations (Figure 9). These results suggest that aesthetic preference formation is determined by cognitive as well as affective stimulus appraisal, whereas aesthetic inference is based on affective stimulus appraisal alone.

Discussion

The aim of this study was to investigate to what extent lay people are able to infer aesthetic preferences of others, an ability that is crucial for social interaction and social bonding (Redies, 2015). Our results show that, despite the known variance of aesthetic preference for fine art (Leder et al., 2016; Vessel et al., 2018), about half of our participants were able to infer the aesthetic preferences of others. This conclusion was reached by analyzing the correlations between single other-assessments and the mean group self-assessments for the dimensions Positive Attraction, Emotionality, and Cognitive Stimulation. More specifically, if we consider a significant correlation as indication of an effective inference, then we found that 22 of our 40 participants (55%) were able to infer emotional attitudes of others evoked by the artworks, 19 participants (47.5%) made reliable inferences about the cognitive stimulation caused by the artworks, and 17 participants (42.5%) could infer to what extent other people found the presented artworks beautiful.

Most importantly, aesthetic preferences were related to cognitive as well as to affective stimulus appraisal, whereas aesthetic inferences were only related to affective stimulus appraisal. Specifically, we observed medium to high individual correlations between Positive Attraction and Emotionality as well as between Positive Attraction and Cognitive Stimulation in the self-assessment. Thus, it seems that our preference data support the dual-process account of aesthetic preference formation (Graf & Landwehr, 2017). In contrast, in the other-assessment the correlation between Positive Attraction and Emotionality was even higher, yet the correlation between Positive Attraction and Cognitive Stimulation was low and not significant. Apparently, most of our participants considered an artwork to be judged as beautiful by others, only if others would hold a positive emotional attitude toward the piece.

In the literature, beauty and aesthetic pleasure are often understood as interchangeable (Armstrong & Detweiler-Bedell, 2008; Reber, Schwarz, & Winkielman, 2004). Brielmann and Pelli (2017), for instance, found a linear relationship between beauty and pleasure and that strong pleasure is always considered beautiful. Hager et al. (2012) ascribe pleasure and beauty to the common dimension, that is, Positive Attraction. Russell (1991) describes pleasure as a pancultural positive emotion. Consequently, if pleasure can be defined as a pancultural positive emotion, beauty could be described as the universal indicator of how good it feels to interact with an aesthetic object (Dubé & Le Bel, 2003).

Hence, the estimated amount of positive emotion triggered by an aesthetic object might be the reference factor underlying aesthetic inference. If a person can estimate the amount of pleasure another person feels while experiencing an aesthetic object, she might adequately estimate whether this person finds the object beautiful. This pleasure estimation might be possible within the same culture or socialized group of people due to shared exposure to aesthetic objects, and thus cultural learning. The inference processes underlying those preference assumptions might be fostered by a kind of simulation (Gordon, 1986) of another person's affective response toward the aesthetic stimulus. It should, consequently, be much

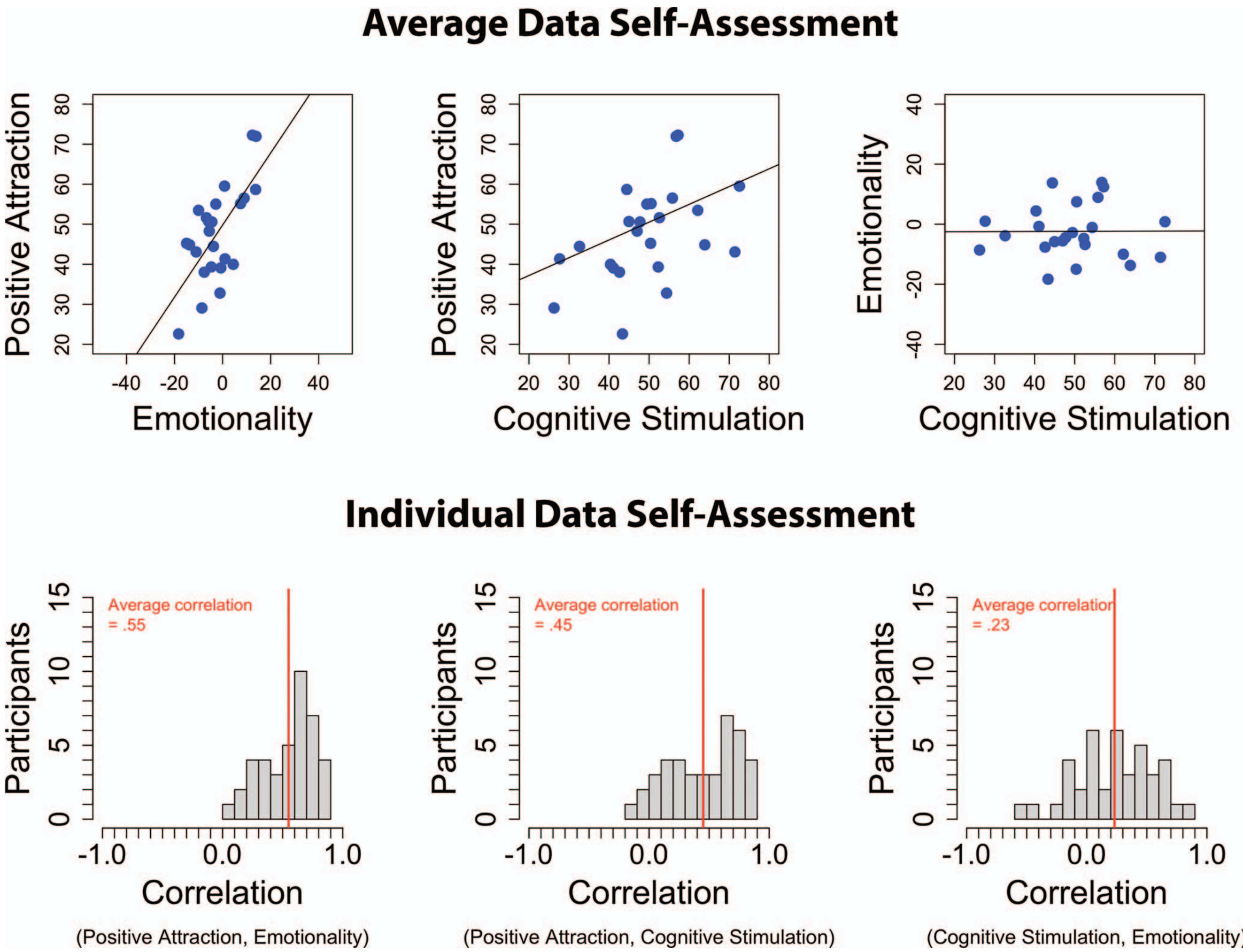

Figure 7. The upper graphs show the relations between the assessed dimensions for the picture-based (averaged across participants) self-assessment ratings. The lower graphs show the distributions of the corresponding individual correlations, where the vertical red line represents the average correlation. See the online article for the color version of this figure.

more difficult to infer aesthetically induced emotions of people from distinct cultures, when people cannot rely on what they have learned about their fellow people's emotional attitudes (Elfenbein & Ambady, 2002), and thus emotion simulation has no background knowledge to be based on.

Table 2
Result of the Multiple Linear Regression Predicting Positive Attraction by Emotionality and Cognitive Stimulation in the Self-Assessment

Predictor	Estimate	*SE*	*t*(21)
(Intercept)	−18.5	10.7	1.74
Emotionality	.90***	.17	5.21
Cognitive stimulation	.46**	.13	3.49
R^2	.65		
F	19.8		

** $p < .01$. *** $p < .001$.

This hypothesis requires further investigation, but might be supported by the fact that our participants were most homogeneous as a group in assessing others′ emotionality, with the highest mean "single other, group other" correlation (r = .52, Cronbach's alpha = .93). Interestingly, the analysis of self-assessment data revealed a reversed picture: Emotionality judgments varied most across participants and produced the lowest mean "single self, group self" correlation (r = .39, Cronbach's alpha = .85). Furthermore, whereas for Positive Attraction as well as for Cognitive Stimulation other-assessments could be predicted by self-assessments, for the Emotionality dimension this was not the case (see Figure 4). Therefore, our results show that, even though participants indicated highly individual emotional responses toward the presented artworks, they could best infer other people's emotionality judgments (averaged individual correlation of "single other, group self," r = .42).

The distinct results of self- and other-assessment for Emotionality might be clarified by research on intergroup preferences. It

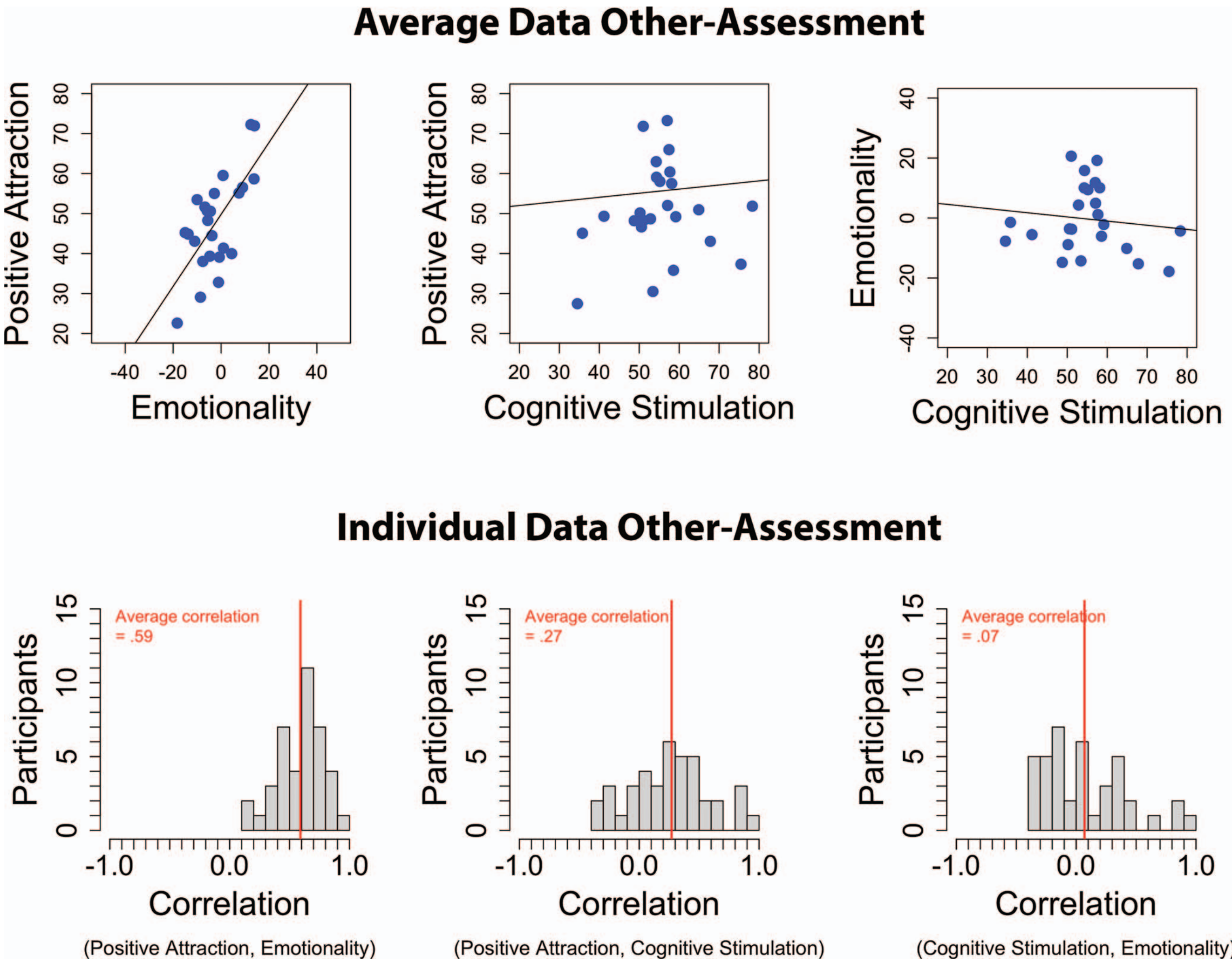

Figure 8. The upper graphs show the relations between the assessed dimensions for the picture-based (averaged across participants) other-assessment ratings. The lower graphs show the distributions of the corresponding individual correlations, where the vertical red line represents the mean correlation. See the online article for the color version of this figure.

has been shown that implicit intergroup preferences appear very early in life, are quite stable over the entire life span, and are possibly due to early affective experiences (Dunham, Baron, & Banaji, 2008; Holbrook & Schindler, 1994). In contrast, persons′ explicit preferences might alter across life span (Pugach, Leder, & Graham, 2017). Yet, although individual aesthetic preferences might change with time, the ability to infer others' emotional responses, due to cultural learning, seems nevertheless to remain (see Cutting, 2008 in this regard).

Table 3
Result of the Multiple Linear Regression Predicting Positive Attraction by Emotionality and Cognitive Stimulation in the Others' Assessment

Predictor	Estimate	*SE*	*t*(21)
(Intercept)	−6.97	10.6	−.66
Emotionality	.87***	.13	6.93
Cognitive stimulation	.25	.14	1.85
R^2	.70		
F	24.5		

*** $p < .001$.

The ability to infer other people's emotional states was systematically investigated by Ong, Zaki, and Goodman (2015). They denoted the ability to reason about other's emotions as "affective cognition." Affective cognition is well distinguished from other ToM concepts, which encompass inferences about mental states, such as thoughts, beliefs, desires, and intentions. The present data suggest that in order to make inferences about aesthetic preferences, people seem to especially use their affective cognition skills, that is, they think about other's emotions elicited by the aesthetic object.

Also, the mere-exposure effect, that is, the conscious or unconscious acquisition of preferences through the repeated

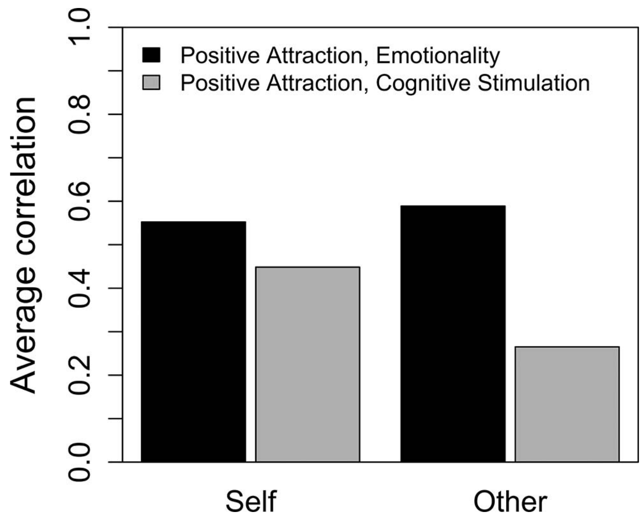

Figure 9. Mean individual correlations of Positive Attraction with Emotionality, and Cognitive Stimulation, respectively, in self- and other-assessment.

encounter of the same stimuli, might account for at least some aspects of aesthetic inference abilities (Zajonc, 1980, 2001). Importantly, Zajonc (1980, 2001) understands affect and cognition to be independent processes. Affective reactions are considered as less diverse than cognitive reactions, which might additionally explain why our participants were best and most homogeneous as a group in their emotion inferences, but stands in contrast to the high variability of individual emotion judgments in the self-assessment.

We would like to highlight one more finding. It has been shown that lay people rely more on their own affective states when judging aesthetic stimuli compared with art experts (Augustin & Leder, 2006; Müller, Höfel, Brattico, & Jacobsen, 2010). Our participants were all, except for two, naïve to art. Their judgments reliably correlated with those of Chatterjee et al.'s (2010) lay people on the dimensions Positive Attraction/Preference and Cognitive Stimulation/Interest, but not with those produced by art experts. Thus, these correlations also indicate differences in aesthetic appreciation between lay people and art experts (Silvia, 2006).

Limitations and Outlook

There are some limitations of this study, which deserve a short discussion. A methodological limitation concerns the fact that we asked participants explicitly to rate their own preferences as well as to assess other's preferences. With this approach, both explicit knowledge as well as implicit, early learned and culture-based common aesthetic preferences possibly influenced the preference judgments (Hahn & Gawronski, 2015; Nosek, Hawkins, & Frazier, 2011). A combination of explicit as well as implicit measurements could provide further insight into the preferred methodology to study aesthetic inferences.

Also, our participants' great variance in inference abilities requires further research. Why could some participants well infer other people's aesthetic preferences, even if those differed greatly from their own taste, while others lacked this skill? Investigating whether aesthetic inference abilities depend solely on general ToM skills, or also on other factors such as gender and education can help to answer this question.

Furthermore, we do not know whom the participants imagined as "other people." We assumed that our participant would refer to other people as people in their proximity, such as people they know or people from their own community or society. A cross-cultural study of aesthetic inference abilities, with participants as well as stimuli from a distinct culture, could provide further insight into the question of whether these inference abilities are universal, culture specific, and/or culture dependent.

Conclusion

Taken together, our results provide evidence for a subjective "theory of aesthetic preferences" (TAP), which can be considered as the ability to reason about and infer other people's aesthetic preferences. This TAP should be understood as a subcategory and specific application of general ToM abilities. Crucially, whereas beauty preferences depend on affective as well as on cognitive stimulus appraisal, beauty inferences seem to be established by affective stimulus appraisal alone. This indicates that lay people's TAP links beauty experience essentially to an accompanied feeling of pleasure, as has also been suggested by other scholars and scientists.

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Correction to van Monsjou and Mar (2019)

In the article "Interest and Investment in Fictional Romances," by Elizabeth van Monsjou and Raymond A. Mar (*Psychology of Aesthetics, Creativity, and the Arts*, 2019, Vol. 13, No. 4, pp. 431–449, http://dx.doi.org/10.1037/aca0000191), the mean level of investment in fictional relationships was incorrectly compared to a midpoint of 3.5, rather than the actual midpoint of 4, in Study 1 and Study 2. Thus, the first paragraph of Results and Discussion for Study 1 and the first sentence of the first paragraph of Results and Discussion for Study 2 were amended to clarify that the correct interpretation of these means is that they fall just below the midpoint (Study 1) and at the midpoint (Study 2) of neither agree nor disagree. In addition, in Table 3, incorrect signs were reported for correlations with "Shipping behavior" (with CI values also presented in an incorrect order), and errors appear in the CI for "Attachment avoidance" (Study 1 only), the *r* (PSR) for "LAS—Altruistic" (Study 2 only), and correlations and CIs for "Relationship length (Expected)," "Number of past relationships" and "Shortest relationship" (Study 1 only). Finally, in Table 5, erroneous values appear for the *F* for change in R^2 for all models except LAS − Possessive, for *B* for LAS—Friendship (Models 1 and 2), and for *SE B* for LAS—Friendship and LAS − Possessive (Model 1). The updated values differ slightly from what was reported, and none of the conclusions have changed. The online version of this article has been corrected.

http://dx.doi.org/10.1037/aca0000311