

Automatic processes in aesthetic judgment: Insights from the Implicit Association Test

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This study employed the Implicit Association Test (IAT) with aim to examine the nature of automatic aesthetic judgment. The main hypothesis was that basic hedonic tone of artwork is one of important factors influencing automatic aesthetic evaluation. We conducted two experiments in which we varied hedonic valence of paintings of figural (Experiment 1) and abstract art (Experiment 2), measured participants' implicit association between these paintings and evaluative attribute dimension via IAT and registered their explicit judgments of paintings' hedonic tone. In both experiments we found that participants were significantly faster in those dual-categorization tasks in the IAT where preselected hedonically "positive" paintings were paired with the positive attributes and hedonically "negative" ones with the negative attributes than the other way around. We additionally found that explicit assessments of the hedonic tone were substantially related to the individual IAT effects in the case of abstract art, but not in the case of figural art. Implications of these findings are discussed.

Key words: aesthetic judgment, paintings, automatic processes, Implicit Association Test (IAT)

Many empirical studies of aesthetic judgment typically emphasized importance of higher cognitive process in making aesthetic evaluations and did not deal with automatic aesthetic processes. Authors explored the higher cognitive processes involved in evaluation of paintings (e.g. Leder, Carbon, & Ripsas, 2006; Russell, 2003; Russell & Milne, 1997) and the role of knowledge and art expertise in making aesthetic judgments (e.g. Hekkert & van Wieringen, 1996; Neperud, 1986). In one of the most prominent models of aesthetic experience, proposed by Leder, Belke, Oeberst, and Augustin (2004), authors particularly stressed the importance of understanding and cognitive mastering of artwork for formation of aesthetic judgments and experience of aesthetic emotions. Other authors also suggested that part of pleasure derived from looking at a painting stems from making a successful interpretation of it and picking up the artist's message (Russell, 2003; Russell & Milne, 1997).

On the contrary, empirical findings from studies dealing with general evaluative responding brought forward the idea that evaluation can be immediate, unintentional and stimulus based (e.g. Duckworth, Bargh, Garcia, & Chaiken, 2002; Zajonc, 1980). Using the evaluative priming procedure, Duckworth, Bargh, Garcia, and Chaiken (2002) challenged the assumption that automatic affective evaluation necessarily involves activation of previously stored evaluation, indicating that it might be driven by online evaluation processes. Since aesthetic evaluation might be seen as a special case of evaluative responding, we believe that these findings imply that, at least in certain situations, aesthetic judgment could also be automatic and stimulus driven. In other words, it is possible that certain part of aesthetic evaluation might be automatic, without including all levels of cognitive processing proposed by Leder and his associates (2004).

Although studies dealing directly with automatic aesthetic processes are relatively scarce, there are many findings indicating presence of automatic processes in the perception and evaluation of art. A manifold of studies point out that aesthetic judgment are formed rather quickly (Lindgaard, Fernandes, Dudek, & Brown, 2006; Locher, Krupinski, Mello-Thoms, & Nodine, 2007; Tractinsky, Cokhavi, Kirschenbaum, & Sharf, 2006). Tractinsky et al. (2006) showed that participants form aesthetic judgments of web pages after being exposed to them for only 500ms and that these impressions remain fairly stable, especially in the case of extreme evaluations. Moreover, Lindgaard et al. (2006) reported that even 50ms interval is sometimes sufficient for the formation of the aesthetic impression. Cutting (2003) suggested that implicit or automatic learning processes make considerable impact on aesthetic judgment. Finally, some authors, like Hekkert (2006), propose that only the initial, mostly perceptual and automatic stages of artwork processing deserve to be treated as being aesthetic, since he believes that the aesthetic experience is restricted to the pleasure that results from sensory perception and thus it is distinct from cognitive and emotional experience.

Typical studies of the aesthetic judgment often rely on different versions of self-report measures. Usually, respondents are asked to report directly on their inner states – aesthetic feelings, preferences, aesthetic experience etc. Depending on respondents' ability, willingness and opportunity to recognize and adequately express these states, the validity of direct or explicit measures of aesthetic preferences might vary and might fail to tap into automatic aesthetic processes. Some authors consider that predominant use of self-report or explicit measures in experimental aesthetics led researchers to focus mainly on processes characterized by cognitive control, intention and awareness and to neglect those based on automatic or implicit cognition (Mastandrea, Bartoli, & Carrus, 2011). Many researchers believe that automatic or implicit processes generally elude explicit measurement techniques and recommend the use of special, implicit techniques for the measurement of automatic processes (cf. Bodenhausen & Todd, 2010; Fazio, 2001; Fazio & Olson, 2003; Greenwald & Banaji, 1995).

Present research aim to provide deeper insights into the nature of aesthetic judgment processes by applying an implicit measurement technique – Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) in the domain of experimental aesthetics. It explores the contribution of the basic hedonic tone of artwork on aesthetic evaluation, since we believe that hedonic tone, as one of the primary factors of evaluative judgments and important dimension of the subjective experience of artwork (Marković, 2010; 2011), might also be one of the factors influencing aesthetic evaluation on an automatic level.

IMPLICIT ASSOCIATION TEST IN THE FIELD OF EXPERIMENTAL AESTHETICS

In the last two decades research and literature on implicit techniques has shown a rapid development. The advantage of these techniques is that they allow us to assess a construct of interest without participants' direct verbal reports. This enables researchers to surpass the potential problem of participants' inability to report on some of their inner states (Greenwald et al., 1998). Despite the fact that at this point there is no common theoretical basis, there is general agreement that these techniques tap primarily into automatic processes (De Houwer & Moors, 2007; Fazio, 2001; Gawronski & Bodenhausen, 2006; Greenwald et al., 1998).

The IAT measures differential association of two target concepts with an evaluative attribute dimension. The procedure begins with the target-concept categorization. In this first step (see Table 1 below) participants categorize stimuli representing two target concepts. This and later categorizations are performed by pressing the left response key for one target concept and the right response key for the other. In the second step the attribute dimension is being introduced also in the form of a two-category differentiation, and participants categorize pleasant versus unpleasant words. Further on, these two categorization tasks are combined to form a dual-categorization task, in which both stimuli for target and attribute dimension appear (see Table 1 and Figure 1 below). Subsequently, participants learn a reversal of response assignments for the target concepts categorization (reversed target concepts categorization in Table 1), and finally the attribute categorization (not changed in response assignments) is combined with this reversed target categorization in the second dual-categorization task. If the target concepts are differentially associated with the attribute dimension, the participant should find one of the combined dual-categorization tasks to be significantly easier than the other. The measure of this difficulty difference provides the measure of implicit association between the target concepts and attribute dimension. This measure is often labeled as the IAT effect. It is assumed that larger IAT effects reflect stronger automatic associations in memory between the concept pairings that facilitate categorization (Greenwald et al., 1998).

Table 1. *Schematic Description and Example of the Implicit Association Test (IAT).*

Description of the task	Example of items assigned to left response key	Example of items assigned to right response key
Initial categorization of stimuli representing two target concepts	Paul Klee's paintings	Franz Kline's paintings
Initial categorization of stimuli representing associated attribute dimension	Unpleasant words	Pleasant words
Initial dual-categorization task	Paul Klee's paintings + Unpleasant words	Franz Kline's paintings + Pleasant words
Reversed target concepts categorization	Franz Kline's paintings	Paul Klee's paintings
Reversed dual-categorization task	Franz Kline's paintings + Unpleasant words	Paul Klee's paintings + Pleasant words

Note. The illustration is based on the examples of the target concepts and attribute dimension from Experiment 2. "Paul Klee + Unpleasant words" means that paintings of Klee and unpleasant words share the same response key. The same reasoning applies to other target concepts and attribute category combinations.

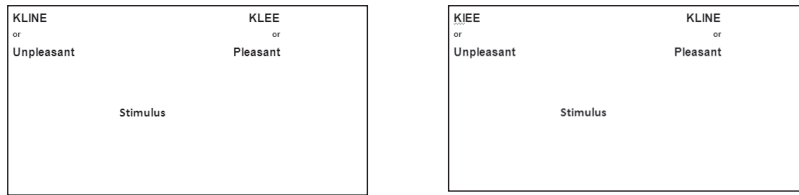


Figure 1. Schematic illustration of the computer screen in two opposite dual-categorization tasks in the IAT. The illustration uses the target concepts and attribute dimension from Experiment 2.

So far, the IAT was mainly used in social psychology, personality research and marketing research. To our knowledge, there are only few studies where the IAT has been applied in experimental aesthetics, and only one of them deals directly with automatic aesthetic evaluation, reporting general implicit preferences of figurative over abstract art and classical over modern architecture among student population (Mastandrea et al., 2011). Mastandrea et al. (2011) account for their findings within a framework of general model of aesthetic preference, referred to as Processing Fluency (Reber, Schwarz, & Winkielman, 2004). Processing Fluency model postulates that aesthetic pleasure is grounded in the processing experiences of the perceiver, which are in part a function of stimulus properties. The more fluently perceivers can process an object, the more positive their aesthetic response. Within this framework, Mastandrea et al. argue that figurative art and classical architecture are more easily processed and therefore preferred over abstract art and modern architecture (cf. Mastandrea et al., 2011). With these initial findings in mind, we assumed that IAT might

be a useful tool in further exploration and better understanding of automatic processes in aesthetic judgment.

RESEARCH OVERVIEW

Having in mind a number of studies that indicate the existence of automatic processes in aesthetic judgment (e.g. Cutting, 2003; Lindgaard et al., 2006; Locher et al., 2007; Tractinsky et al., 2006) and following the line of research initiated by Mastandrea et al. (2011), we wish to provide further evidence regarding the nature of automatic aesthetic processes. Unlike Mastandrea et al. (2011), we approached the nature of aesthetic preferences from the perspective of affective reactions, with the idea that the basic hedonic tone of artwork, as one of the primary factors of general evaluation, might also be one of the factors influencing automatic aesthetic evaluation. In order to test this hypothesis we conducted two experiments in which we carefully selected paintings of relatively uniform artistic value (all paintings were recognized and appreciated works of art) and unambiguous hedonic tone and we measured participants' averaged categorization latencies to these stimuli within IAT dual-categorization tasks (see Table 1 and Figure 1). Additionally, we registered subjective experience of the hedonic tone of the paintings and looked for the correspondence between these assessments and individual differences in IAT effects. We believe that the magnitude of the difference between averaged categorization latencies in the opposite dual-categorization tasks (i.e. IAT effect) would reflect the strength of automatic association between artwork and their general evaluation in terms of hedonic valence if such association existed. We also believe that the significant correspondence between the IAT measures and hedonic tone assessments could additionally support this hypothesis. Since we wanted to extend findings of Mastandrea and associates (2011), we were interested to explore IAT effects within more specific and narrow categories of artistic stimuli than those used in Mastandrea's research. Therefore we focused on the IAT effects within a semantically homogenous category of artistic portraits (Experiment 1) and within a category that lacks semantic information (i.e. abstract art) (Experiment 2).

EXPERIMENT 1

In the first experiment we ask whether the IAT effect occurs at the level of semantically similar artistic stimuli such as portraits and, if so, whether automatic aesthetic evaluation relies on the basic hedonic tone of these paintings. We chose figural paintings (i.e. portraits) of both positive and negative hedonic tone as stimuli in the IAT, and measured participants' categorization latencies in dual-categorization tasks. We assume that responses will be facilitated when "positive

paintings” shared the same response key with positive attributes and “negative paintings” with negative attributes. In other words, we expect to obtain a general implicit preference for “positive paintings” over hedonically “negative” ones. The “positive” and “negative” paintings were selected on the basis of Marković’s (2010; 2011) empirical findings in his previous research. In these studies, Marković explored subjective experience of paintings, established hedonic tone as one of its important dimensions and provided averaged assessment of the hedonic tone dimension for paintings of different authors. For this research, we selected paintings with high or low rank on the hedonic tone dimension.

Method

Participants. A total of 38 undergraduate students (25 female and 13 male) from the Department of Psychology, University of Belgrade, participated in the experiment as part of their academic requirements.

Stimuli. Three paintings by Leonardo da Vinci of similar content and style were chosen to represent aesthetic stimulation of positive hedonic valence and three paintings by Jean Dubuffet were selected to represent aesthetic stimulation of negative hedonic valence (for a detailed list of paintings see Appendix A). Paintings of Leonardo and Dubuffet depicted human figures; their reproductions were of similar resolution and size and were placed on a black background. Exemplars for the IAT attribute categories were selected from the Connotative Dictionary for Serbian Language (Janković, 2000a, 2000b). Connotative dictionary is the large set of standardized, emotionally-evocative words that includes contents across a wide range of semantic categories. It was developed to provide a set of normative lexical stimuli that can be used for further experimental investigations of affective meaning-related phenomena. Concepts with prominent positive or negative affective valence were selected, where each concept had a matching opposite. Stimuli from the positive attribute category were as follows: *happiness, joy, love* and *smile*. Stimuli from the negative attribute category were: *sadness, sorrow, hate* and *cry*. Following the recommendation by Lane, Banaji, Nosek and Greenwald (2007), stimuli words within the attribute categories did not begin with the same letter in order to avoid facilitation.

IAT. Participants completed the standard IAT which consists of seven blocks of trials (cf. Greenwald et al., 1998). The test was designed using the Super Lab Pro 4 and was administered on a computer. Attribute categories were labeled *good* and *bad*, and target concepts were labeled *Leonardo* and *Dubuffet*. The procedure started with introduction of response mapping rules in the first and the second block of trials. In the first block (see Table 2), participants practiced the rules by pressing the left response key when Dubuffet’s paintings appeared and the right key when Leonardo’s paintings appeared. In the second block, participants pressed the same response keys for respectively unpleasant (left) and pleasant (right) words. In the third and fourth block of trials (i.e. *Dubuffet+ bad_Leonardo +good* dual-categorization task in further text) participants performed a dual-categorization task in which the left response key was assigned to Dubuffet’s paintings and unpleasant words and the right key to Leonardo’s paintings and pleasant words. The third block represented a practice block and had substantially fewer trials than the main, fourth block (see Table 2). Further on, in the fifth phase participants practiced the new response-mapping rule in which positions of target concepts were reversed (left response key was reassigned to Leonardo and the right response to Dubuffet). Finally, in the last two blocks, participants performed the dual-categorization task again, with Dubuffet’s paintings being mapped together with pleasant words and Leonardo’s paintings with unpleasant words (i.e. *Leonardo+bad_Dubuffet+good*

dual-categorization task in further text). Again, the sixth block represented a practice block and had substantially fewer trials than the main, seventh block (see Table 2).

Table 2. *The Structure of Leonardo-Dubuffet IAT*

Blocks	No. of Trials	Items assigned to left response key	Items assigned to right response key
1.	18	Jean Dubuffet	Leonardo da Vinci
2.	16	Unpleasant words	Pleasant words
3.	14	Jean Dubuffet Unpleasant words	Leonardo da Vinci Pleasant words
4.	42	Jean Dubuffet Unpleasant words	Leonardo da Vinci Pleasant words
5.	36	Leonardo da Vinci	Jean Dubuffet
6.	14	Leonardo da Vinci Unpleasant words	Jean Dubuffet Pleasant words
7.	42	Leonardo da Vinci Unpleasant words	Jean Dubuffet Pleasant words

Note. The table illustrates one of the two possible dual-categorization task-order conditions of coupling the target concepts with the positive or the negative attribute category. This order effect was counterbalanced across subjects.

Each stimulus in the IAT was presented till a participant provided a response, with inter-trial interval of 400 ms. Incorrect responses were indicated by “X” in the middle of the screen with an instruction to categorize the same stimulus again. The response latencies were measured from the stimulus onset till the correct answer was given by pressing one of the two keys.

Self-report measures. Each participant provided ratings of all paintings that were used as stimuli in the IAT on six unipolar seven-point scales referring to the paintings’ hedonic connotation (see Appendix B). The scales were chosen on the basis of previous research which suggested that they represented valid indicators of paintings’ hedonic tone (Marković, 2010). Since these scales were developed based on evaluation of wide set of paintings that covered the spectrum of different styles and themes, we considered them as more specifically related to aesthetic judgment of paintings, than to any other type of stimuli. Three positive scales (*lovely*, *charming* and *cheerful*) and three negative scales (*scary*, *disgusting* and *hateful*) were selected.

Procedure. Subjects completed the IAT using notebook computers in individual cubicles. Having in mind possibility of the learning effect (i.e. that the slower RT after the reversal of response mapping can reflect interference between old and new response mapping rules and not the implicit association), we counterbalanced the order of coupling the target concepts with the positive or the negative attribute category across subjects (following the recommendation by Lane et al., 2007). Half of participants completed the IAT in which the *Dubuffet+bad_Leonardo+good* block was presented first (as shown in Table 2), while the other half did the alternative version of the IAT where *Leonardo+bad_Dubuffet+good* block was administered first. The completion of the IAT lasted 7 minutes in average. The order of measurement collection of IAT versus self-report measures was also counterbalanced across subjects.

Results and Discussion

Self-report measures of the hedonic tone. In the first step, check was made for the internal consistency of the hedonic tone scales (for Dubuffet's paintings Cronbach's alpha was 0.83, and for Leonardo's paintings it was 0.84). For each author, measures of the hedonic tone were computed by averaging across three positive scales (lovely, charming and cheerful) and three negative scales (scary, disgusting and hateful). The values for the negative scales were coded reversely. Results of the t-test showed significant difference between the average evaluation of paintings of Dubuffet and Leonardo: $t(37) = 7.19, p < .01$. Participants attributed more positive hedonic tone to Leonardo's paintings ($M = 4.89, SE = 0.12$) than to Dubuffet's paintings ($M = 3.87, SE = 0.09$).

Difference between average categorization time in the opposite dual-categorization tasks. We expected that participants will respond faster when Leonardo's paintings were mapped together with the positive attribute category and Dubuffet's paintings with the negative attribute category, than vice versa. We computed the averaged response latencies from the main dual-categorization blocks, i.e. Block 4 and Block 7 (see Table 2) and compared them. The results confirmed this hypothesis ($t(37) = 5.51, p < .01$). Participants were faster in the *Dubuffet+ bad_Leonardo +good* block ($M = 587.99, SE = 11.35$) compared with *Leonardo+bad_Dubuffet+good* block ($M = 722.94, SE = 30.2$). This suggests that automatic aesthetic reaction could be triggered by semantically homogenous paintings such as artistic portraits. Also, this is in line with the assumption that the IAT taps into the hedonic tone aroused by the paintings.

The IAT effect. Measure of the association strength (i.e. IAT effect measure or D measure) between the target concepts (paintings of Leonardo and Dubuffet) and attribute dimension was based on the improved scoring algorithm suggested by Greenwald, Nosek & Banaji (2003). Following the steps of the algorithm, we first eliminated the trials that were greater than 10 000 ms. Then we looked for participants who had latencies shorter than 300msec in more than 10% of trials. No such subjects were identified. Subsequently, we applied the IAT effect equation, where M stands for the mean and SD for the inclusive standard deviation of respective blocks.

$$IAT_{effect} = MEAN\left(\frac{M_{block6} - M_{block3}}{SD_{block6 \& 3}}, \frac{M_{block7} - M_{block4}}{SD_{block7 \& 4}}\right)$$

The IAT effect measure computed in this manner takes into account each respondent's latency variability and their response latencies in both practice and main dual-categorization blocks and shows superior metric characteristics to all alternative methods of IAT effect calculations, including the simple comparison of categorization times (cf. Greenwald et al., 2003). It represents an effect-size-like measure with a possible range from -1.5 to +1.5; values above zero score obtained in this research indicated preference towards Leonardo's paintings, and

values below zero score preference towards Dubuffet's paintings. The average association strength measure was 0.575 ($SD=0.35$) indicating moderate preference for Leonardo's paintings. This preference was in line with the preference obtained on self-report hedonic tone scales and it additionally supported the assumption that the IAT effect measure taps into the hedonic tone of an artwork.

Correspondence between IAT and self-report measures. Given that preference for Leonardo's (i.e. hedonically "positive") over Dubuffet's (hedonically "negative") paintings was found on both self-report and IAT measures, we asked whether the same individuals produced the parallel patterns on both tasks. The self-report measure of the relative preference for Leonardo's paintings over Dubuffet's paintings was construed by subtracting the average hedonic tone measure of Dubuffet's paintings from the average hedonic tone measure of Leonardo's paintings. In this manner, we computed a measure of explicit preference that conceptually corresponds to the implicit preference measured by IAT. However, there was no significant correlation between the IAT and this measure ($r = -.008$; $p = .962$). The lack of correlation between implicit and self-report measures might have come for variety of reasons. Some researchers suggest that since implicit and explicit measures tap into different underlying processes (i.e. automatic vs. controlled), they might not necessarily lead to the same outcomes (e.g. Fazio & Olson, 2003; Gawronski & Bodenhausen, 2006; Nosek, 2005; Nosek & Smyth, 2007). It could have happened that the explicit evaluation of the hedonic tone had been based on the automatic affect activation, which was then altered via subsequent phase of controlled processing. There also might be a methodological rationale behind the discrepancy between the IAT and self-report measures. In general, correspondence between implicit and explicit measures varies as a function of the difference between evaluations of two categories of objects. The maximum correlations are obtained when preference for one category excludes the preference for the other (Hofmann, Gawronski, Gschwender, Le, & Schmitt, 2005; Nosek, 2005). In other words, if participants do not judge the classes of paintings in a significantly different manner there is a tendency for correlation coefficients to decrease.

EXPERIMENT 2

The idea that automatic evaluation might be unintentional, immediate and purely stimulus-driven, together with the findings showing that aesthetic evaluation sometimes forms rather quickly, suggest that automatic processes of aesthetic judgment might take place even before higher cognitive processing of meaning comes into play (Duckworth et al., 2002; Locher et al., 2007; Tractinsky et al., 2006). In order to explore this hypothesis, and to provide further evidence on nature of automatic aesthetic processes that underlie aesthetic judgment, we replicated the Experiment 1 using abstract paintings as stimuli. Abstract art usually lacks representational content and exclusively relies on variations in

color, shape and form. We wanted to check if the same IAT effects, as reported in the previous experiment, would be replicated with the stimuli lacking overt realistic properties. We believe that such replication would additionally support the stand that automatic affective processing represents an important part of aesthetic judgment formation.

Method

Participants. The same 38 undergraduates (25 female and 13 male) that participated in Experiment 1 took part in the present experiment as well.

Stimuli. Three paintings by Paul Klee of similar content and style were chosen to represent aesthetic stimulation of positive hedonic valence and three paintings by Franz Kline were selected to represent aesthetic stimulation of negative hedonic valence (for a detailed list of paintings see appendix A). The “positive” and “negative” paintings were again selected on the basis of Marković’s (2010, 2011) previous research. The reproductions of the selected paintings were of similar resolution and size and placed on a black background. Exemplars of the IAT attribute categories were the same as in the previous experiment.

The IAT and Self-report measures of hedonic tone. We administered the standard version of the IAT (Greenwald et al., 1998) and collected ratings of the selected Kline’s and Klee’s paintings on the same hedonic tone scales (Marković, 2010). The overview of different phases and tasks within the Klee-Kline IAT is presented in Table 3. Based on the averaged hedonic tone values obtained for these authors’ paintings in previous research, we hypothesized that participants will associate paintings of Klee with positive attribute category and paintings of Kline with negative attribute category (Marković, 2010, 2011).

Procedure. The procedure was identical to the procedure in Experiment 1.

Table 3. *The Structure of Klee – Kline IAT*

Blocks	No. of Trials	Items assigned to left response key	Items assigned to right response key
1.	18	Paul Klee	Franz Kline
2.	16	Unpleasant words	Pleasant words
3.	14	Paul Klee Unpleasant words	Franz Kline Pleasant words
4.	42	Paul Klee Unpleasant words	Franz Kline Pleasant words
5.	36	Franz Kline	Paul Klee
6.	14	Franz Kline Unpleasant words	Paul Klee Pleasant words
7.	42	Franz Kline Unpleasant words	Paul Klee Pleasant words

Note. The table illustrates one of the two possible dual-categorization task-order conditions of coupling the target concepts with the positive or the negative attribute category. This order effect was counterbalanced across subjects.

Results and discussion

Self-report measures of the hedonic tone. Hedonic tone scales showed acceptable internal consistency (for Klee's paintings Cronbach's alpha was 0.88, and for Kline's paintings it was 0.78) and we calculated the average score of the hedonic tone of the paintings. Results of the t-test were significant: $t(37) = -14.12$, $p < .01$. Klee's paintings were evaluated to arouse quite positive affects: ($M = 5.87$, $SE = 0.1$) which was in line with our expectations, while Kline's paintings were judged neutral ($M = 3.97$, $SE = 0.09$). Nevertheless, the obtained difference between the average hedonic tones of the paintings was still in line with our initial assumptions, i.e. that selected Klee's work would be judged in a more positive manner than Kline's.

Difference between average categorization times in the opposite dual-categorization tasks. We hypothesized that participants will be faster in those dual-categorization tasks where Klee's paintings were paired with the positive attributes and Kline's with the negative ones. We again computed the averaged response latencies from the main dual-categorization blocks, i.e. Block 4 and Block 7 (see Table 3) and compared them. Results of t-test confirmed our assumption: $t(37) = 4.94$, $p < .01$. Participants were faster in the *Klee+ bad_Klee +good* block ($M = 590.07$, $SE = 13.18$) compared to *Klee+ bad_Kline +good* block ($M = 734.57$, $SE = 34.27$). The results showed two things: (a) that automatic aesthetic reaction could be triggered by paintings that lack semantic information (i.e. abstract art) (b) that the difference between averaged categorization latencies corresponds to the difference in the hedonic tone of the paintings in an expected way.

IAT effect. We calculated the IAT effect measure following the algorithm described in the Results and Discussion section of Experiment 1 and obtained the average value of 0.506 ($SD = 0.39$) which reflects the moderate tendency of preferring Klee's over Kline's paintings. This tendency was in line with the one obtained on explicit measures, (i.e. hedonic tone scales) and again quite similar to the results obtained in the first experiment.

Correspondence between IAT and self-report measures. In order to check whether the same individuals produced the parallel patterns on IAT measures and hedonic tone scales, we tested the correlations between these implicit and explicit measures of aesthetic preferences and obtained a significant correlation, $r = .410$; $p < .001$. Given that the average correlation coefficient between the IAT and self-report measures equals .24 (Hofmann et al., 2005), we are inclined to say that the obtained correspondence is relatively high for implicit-explicit construct relations. Such high correspondence may imply that similar processes operate behind both automatic and more intentional and controlled aesthetic judgment of abstract artistic stimulation.

Correspondence between IAT and self-report measures across experiments. The differences in the correlation coefficients between IAT and self-report measures

obtained in two experiments probably reflected different ways participants made either implicit or explicit judgments across experiments. Having in mind that stimuli pairs of relatively similar hedonic value were selected across experiments, we assumed that if the implicit measures tap into automatic processes and are relatively content independent, strong correlations between IAT measures are expected across experiments. Moreover, if higher cognitive processes taking place after automatic evaluation indeed are the reason for null correlation in Experiment 1, low or null correlation between experiments would be expected for self-report measures. We obtained results which supported these assumptions – IAT measures correlated significantly across experiments ($r = .430$; $p < .01$), while no significant correlation appeared between self-report measures ($r = .117$; $p = .483$).

GENERAL DISCUSSION

The main goal of this study was to explore the hypothesis that the hedonic tone of the paintings, as one of the primary factors of general evaluation, and important dimension of subjective experience of artwork, could be one of the factors influencing automatic aesthetic evaluation. We approached this problem experimentally, looking for general trends in reaction times to paintings in different dual-categorization tasks in the IAT. In addition, we investigated individual differences in judgment given on the implicit, automatic level and on explicit, self-reported and controlled one, and explored the relation between these two type of judgments. We also explored relations between implicit and explicit judgments across experiments. In two experiments we assessed participants' implicit reactions to paintings of different hedonic valence. We expected that these reactions would be related to the hedonic tone of paintings if such association existed. In the first experiment we chose paintings of similar content (human figures), while in the second experiment we presented abstract paintings that lacked realistic (figural) content. In both experiments the paintings were selected on the basis of their hedonic valence established in previous research (Marković, 2010, 2011).

The results can be summarized as follows: (a) Participants were significantly faster in the IAT dual-categorization tasks when hedonically “positive” paintings were paired with the positive attributes and hedonically “negative” ones with the negative attributes than the other way around; (b) Individual self-reported assessments of the hedonic tone were substantially related to the individual IAT effects in the case of abstract art, but not in the case of figural art; (c) IAT effects correlated significantly across experiments, while self-reported measures didn't.

Implicit measurement techniques generally require participants to react to stimuli as quickly as possible (e.g. in this study the average reaction times in both experiments were significantly shorter than 1000ms). Therefore, it is generally assumed that these responses are, to some extent, due to processes that do not engage intention, awareness and control (cf. De Houwer & Moors, 2007).

Mastandrea et al. (2011) showed that aesthetic evaluation of stimuli like art and architecture can be activated automatically. In this study we demonstrated significant IAT effects within the categories of abstract and figural art. Unlike the authors who believe that automatic evaluation is based on perceptual and cognitive factors (cf. Hekkert, 2006; Mastandrea et al., 2011), the results of our study suggest that these aesthetic evaluations are probably partially based on automatic hedonic reactions triggered by a work of art. The fact that these reactions occur even in case of abstract art, with no obvious realistic (figural) content, implies that these reactions are basic and that they might not exclusively depend on higher processing of meaning as work of Zajonc (1980) and Duckworth et al. (2002) suggest. Aesthetic judgments may be formed instantly in a parallel fashion, encompassing both perceptual analysis and instant affective reactions. Further research on this issue, contrasting a much larger and more diverse set of figural and abstract aesthetic stimuli is needed.

Correspondence between the judgment of the hedonic tone and automatic aesthetic reactions observed with abstract but not with representational (figural) paintings, deserves special attention. Possible explanation of this discrepancy is methodological. Namely, the range of the hedonic tone of the stimuli was lower in the case of representational stimuli which, in turn, could have affected the correlation. Future studies should test this assumption by using figural stimuli that differ more in their hedonic tone. Theoretically relevant explanation might be that people predominantly rely on automatic reactions when work of art lacks obvious meaning, forming their judgments solely on the basis of their automatic aesthetic feelings. On the other hand, when presented with representational art, apart from the initial automatic reactions, it could be assumed that higher cognitive processing is engaged (as proposed in the comprehensive model of Leder et al., 2004). This, in turn, could bring judgments that differ from those based solely on automatic reactions. The fact that IAT effects were related across experiments, and that self-reported judgments were not connected, also supports such hypothesis. Additional research however should provide further evidence on this issue.

Apart from the basic hedonic reactions, artwork sometimes elicits specific aesthetic experience that can be described in terms of exceptionality, profoundness, uniqueness, etc, independent from the general hedonic tone of artwork (Marković, 2010). It would be interesting to investigate whether this type of exceptional aesthetic experience, which relies on differences in the aesthetic value of art, is predominantly due to controlled and intentional processes, or is it primarily influenced by automatic processing. Being a valid method in the field of experimental aesthetics and a useful tool in research on the automatic aesthetic processes, we believe that the IAT could also be helpful in exploring the nature of this type of aesthetic emotions. For instance, future studies might investigate the automatic nature of such emotions by presenting artwork and pictures with the same content that lack aesthetic value as stimuli in the IAT.

The focus of our study was on aesthetic judgment and not evaluative judgment in general, although we see aesthetic evaluation as a special case of

general evaluation. We were interested to explore automatic aesthetic processes operating behind evaluation of paintings as a category of aesthetic stimuli and therefore believe that that our results and their interpretation, although definitely related to general evaluation, should be still restricted to aesthetic judgments.

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Appendix A
List of paintings used as stimuli in the present study

1. Jean Dubuffet
 - a. *Dhotel Nuance d'Abricot* (1947)
 - b. *Joë Bousquet in Bed* (1947)
 - c. *Supervielle* (1945)
2. Leonardo Da Vinci
 - a. *Lady with an Ermine* (1492–1495)
 - b. *Ginevra de' Benci* (1474–1478)
 - c. *La Belle Ferroneire* (1490–1496)
3. Paul Klee
 - a. *Southern (Tunisian) Gardens* (1919)
 - b. *Flora on the Sand* (1927)
 - c. *Farbtafel* (1930)
4. Franz Kline
 - a. *New York* (1953)
 - b. *Requiem* (1958)
 - c. *Untitled* (1957)

Appendix B
Hedonic tone scales used in this study (Marković, 2010).

Tragic	1	2	3	4	5	6	7
Disgusting	1	2	3	4	5	6	7
Charming	1	2	3	4	5	6	7
Appealing	1	2	3	4	5	6	7
Cheerful	1	2	3	4	5	6	7
Scary	1	2	3	4	5	6	7