

# Psychology of Aesthetics, Creativity, and the Arts

## A Test of the Aesthetic Experience--Introspection Claim

--Manuscript Draft--

<b>Manuscript Number:</b>	
<b>Full Title:</b>	A Test of the Aesthetic Experience--Introspection Claim
<b>Abstract:</b>	<p>It has recently been claimed by neuroscientists that intense aesthetic experiences involve introspection (Belfi, et al., 2019; Vessel, Starr, &amp; Rubin, 2012, 2013). This claim was inferred from the finding that intensity of aesthetic experience ratings by participants while viewing paintings in an MRI scanner were associated with activation of the default mode network of the brain. The fact that this network has been associated in multiple studies with self-referential thinking led the researchers to infer that intense aesthetic experience involves introspection. Since this claim is based on only indirect evidence, here we provide a direct test of the aesthetic experience-introspection hypothesis. We replicated the behavioral aspect of Vessel et al.'s study, asking participants to rate the intensity of their experience while viewing eight paintings. We then asked them to report (in writing) what they were thinking and feeling while looking at the artworks. Responses were classified by two independent raters as involving introspection or not. Introspective responses were more likely when participants reported high (rather than low) levels of feeling moved. However, introspection also occurred during low levels of feeling moved, and non-introspective responses occurred as often as introspective ones at high levels of feeling moved. These findings support a weak but plausible version of the hypothesized link between aesthetic experience and introspection.</p>
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## BOSTON COLLEGE

Department of Psychology and Neuroscience

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To the Editors of PACA,

We are submitting a paper entitled "A Test of the Aesthetic Experience--Introspection Claim."

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Sincerely yours,

A handwritten signature in black ink that reads "Ellen Winner" with a long horizontal flourish extending to the right.

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A Test of the Aesthetic Experience--Introspection Claim

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## The Aesthetic Experience--Introspection Claim: A Direct Test

There is now a growing consensus among empirical researchers about what constitutes an aesthetic experience (Menninghaus, Wagner, Hanich, Jacobsen, & Koelsch (2019; Schindler et al., 2017). Four properties have been associated with such experiences. (1) They are pleasurable. (2) They involve an evaluative component: the more pleasure we feel, the more we positively evaluate the object of our aesthetic experience (3) They are associated with so-called “aesthetic emotions” such as the feeling of beauty, awe, fascination, and being moved. (4) Despite the fact that aesthetic experiences are deeply pleasurable, they may involve negative emotions such as sadness, fear, horror, or suspense. Negative emotions are hypothesized to intensify aesthetic experiences and make them more memorable (Menninghaus, 2015; Menninghaus, Wagner, Hanich, Jacobsen, & Koelsch, 2019).

It has recently been claimed by neuroscientists that aesthetic experiences have yet another component: they involve introspection (Vessel, Starr, & Rubin, 2012, 2013). This claim was based on a functional MRI study examining the brain’s response to intense aesthetic experiences. While lying in an fMRI scanner, participants viewed 109 paintings on a screen. Each painting was shown for six seconds, and participants were instructed to rate each on a scale of 1 to 4 (by pressing a button) in terms of “how strongly you respond,” “how much you find the painting beautiful, compelling, or powerful,” “how much the image moves you,” and “what works you find powerful, pleasing, or profound” (p. 3). Later, participants saw each

painting outside of the scanner for six seconds and rated the intensity (on 7-point scale) with which each work evoked joy, pleasure, sadness, confusion, awe, fear, disgust, beauty, and the sublime.

Participants did not agree on which works they rated the highest. However, across participants, when they rated the work at level 4, the brain's default mode network (DMN) was activated. In contrast, ratings of 1, 2, or 3 were not associated with DMN activation. Thus, only the most moving, beautiful, pleasing, compelling, profound, and powerful works were associated with activation of the DMN.

What conclusions can we draw from this? The DMN is a distributed network associated with (among other functions) self-referential thinking such as retrieval of autobiographical memories (Andreasen et al., 1995; Buckner, Andrews-Hanna, & Schacter, 2008; Gusnard & Raichle, 2001; Gusnard, Akbudak, Shulman, & Raichle, 2001; Kelley et al., 2002; Mitchell, Banaji, & Macrae, 2005). Based on what we know about the role of the DMN in introspection, the researchers concluded that the experience of being moved by art is associated with turning inward and self-relevant mentation. A relationship between activation of the DMN and rated pleasingness of images was found again by Belfi et al. (2019) when participants used a squeeze ball to rate their feelings of pleasure over time. In the first few seconds of viewing a painting, the DMN was more highly activated for very pleasing images.

While two studies have now demonstrated the association of intense aesthetic experiences with the involvement of the DMN, the conclusion that aesthetic experience involves introspection may be premature. This claim is based on only

indirect evidence: feeling moved is associated with activation of the DMN which in turn has been shown, in other studies, to be associated with inward-directed thought.

What is needed is a direct behavioral measure assessing whether introspection is actually associated with intense aesthetic experiences. In the study reported here, we asked participants to view works of art, rate them in the same way as in the Vessel, Starr, and Rubin (2013) study, and then to report on what they were thinking and feeling as they looked at the work. We then coded their comments for evidence of self-relevant mentation. Participants also rated the intensity with which they felt joy, pleasure, sadness, confusion, awe, fear, disgust, beauty, and the sublime, showing us the emotions associated with aesthetic experiences.

## **Method**

### **Participants**

Participants consisted of 50 individuals (41 female, 9 male) ranging in age from 19 to 38 years ( $M = 24.7$ ,  $SD=4.2$ ). Data from 50 participants were recruited through Qualtrics. Sample size was not determined by a power analysis as there was no prior relevant research on which to base such an analysis. Because the study was conducted in China (the first author was a student at an American university which had sent all of its students home during the first year of the Covid-19 pandemic), 47 participants were from China, 3 from the US or Canada. According to a brief questionnaire participants completed at the beginning of the study, prior to Covid-19, 34% reported visiting an art museum over 3 times a year, 26% 2-3 times a year, and 36% once a

year. Participants were compensated with a \$20 Amazon gift card after completing the study.

### **Materials and Procedure**

Eight paintings were selected as stimuli. We selected only eight because the data collected were qualitative and required intensive coding. Four paintings were representations of landscapes, four were representations of people. Two of each kind depicted positive content; two depicted negative content. The full set of paintings is listed and described in Appendix 1.

Participants viewed each painting on screen for 30 seconds. Instructions were as follows:

In this experiment, you will be asked to make judgments about 8 artworks.

Imagine that the images you see are paintings that may be acquired by a museum of fine art. The curator needs to know which paintings are the most aesthetically pleasing, based on how strongly you as an individual respond to them. Your job is to give your gut-level response, based on how much you find the painting beautiful, compelling, or powerful. Note: The paintings may cover the entire range from “beautiful” to “strange” or even “ugly.” Respond on the basis of how much this image “moves” you. What is most important is for you to indicate what works you find powerful, pleasing, or profound. After looking at each painting for 30 seconds, you will be asked a series of questions

After 30 seconds of looking at the painting, participants proceeded to a new screen with the painting along with the question “How strongly does this painting move



you?” They were given a choice of rating the painting at 1, 2, 3, or 4. They then proceeded to a new screen with the painting along with the following instructions: “Rate the intensity with which each artwork evokes the following evaluative/emotional responses, from 1 to 7.” The terms listed were joy, pleasure, sadness, confusion, awe, fear, disgust, beauty, and sublime. They then proceeded to a final screen with the painting along with the following instructions: “Please tell me what you were thinking and feeling as you looked at this painting.” Participants typed their response with no length limit.

## **Results**

### **Relationship between Feeling Moved and Introspection**

Participants’ descriptions of what they were thinking or feeling while looking at each painting were coded by both authors independently. Coders had no knowledge of the rating from 1 to 4 that was associated with each description. The overall interrater reliability was 95%. We calculated interrater reliability for each painting, and reliability ranged from 92.5% to 97%, as shown in Appendix 1. We coded the 400 written responses (50 participants x 8 paintings) into one of three categories, defined below. Sample responses of each kind are shown in Table 1.

*Cognitive Introspection:* Responses were coded as instances of cognitive introspective when the work triggered an autobiographical memory.

*Emotional Introspection:* Responses were coded as instances of emotional introspection when participants described how the painting made them feel (mentioning emotions) or how much they loved or liked the painting.

*Cognitive and Emotional*: Responses that included both kinds of introspection were coded in both ways.

*No introspection*: Responses were coded as involving no introspection when participants responded in one of the following ways: describing the content of the painting; describing what they thought the person in the painting was thinking or feeling; describing the feeling the painting expressed (rather than elicited); or interpreting the meaning of the painting. Responses that included both introspection and non-introspection were coded as introspective. Thus a response coded as introspective did not mean that the participant did not also make non-introspective comments.

Figure 1 displays the proportions of each of these four kinds of codes. As can be seen, a little over half of the responses were *not* introspective. We performed a Pearson chi-square analysis on all 400 observations (8 paintings x 50 participants) to determine the relationship between ratings of feeling moved and either kind of introspection versus no introspection. When we used all four levels of moved the analysis was significant, Pearson Chi-Square (3,  $N = 400$ ) = 14.508,  $p = .002$ ). Figure 2 reveals that the frequency of introspection responses was lowest for levels 1 and 2 of moved, and highest for levels 3 and 4. By contrast, the frequency of no-introspection responses was highest for levels 1 and 2 and lowest for levels 3 and 4.

We next collapsed levels 1-2 (low levels of moved) and levels 3-4 (high level of moved) and repeated the chi-square analysis to examine the link between two levels of moved and introspection of either kind versus no introspection. The results, shown

in Figure 3, were again significant, Pearson Chi-Square (1,  $N = 400$ ),  $p = .002$ . Figure 3 shows a higher proportion introspective responses, either cognitive or emotional, during high levels of being moved.

Twenty-seven of the responses coded as introspection included both emotional and cognitive introspection and were thus given a dual code. So that we could determine the relationship between levels of moved and each of the two types of introspection, we conducted a Pearson chi-square test only on the 145 responses coded as either cognitive or emotional, omitting the no-introspection. (Responses that included one kind of introspection and another kind of non-introspection were retained; only those including both cognitive and emotional introspection were excluded.) Entering all four levels of moved results in a non-significant finding, Pearson Chi-Square (3,  $N = 145$ , = 1.193,  $p = .755$ . At each of the four levels of moved there were considerably emotional than cognitive introspective responses, as show in Figure 4. We then repeated the analysis collapsing moved levels 1-2 and levels 3-4. Again, results proved non-significant, Pearson Chi-Square (1,  $N = 145$ ) = .073,  $p = .787$ .

### **Evaluative/Emotional Intensity Scores**

A multiple regression was performed to determine which if any intensity ratings for the nine evaluative/emotional terms predicted higher valued of feeling moved, and higher frequency of introspection. We were especially interested in whether the predictors for feeling moved were also associated with either kind of introspection.

When we regressed the mean intensity scores of the nine terms (joy, pleasure, beauty, sadness, confusion, fear, disgust, sublime, awe) onto moved ratings, the overall regression was statistically significant,  $F(9, 398) = 36.71, p < .001$ , with an  $R$  squared of .46. As can be seen in Table 1, the predictors of feeling moved were sadness (standardized  $\beta = .214, p < .001$ ), beauty (standardized  $\beta = .281, p < .001$ ), fear (standardized  $\beta = .204, p < .001$ ), awe (standardized  $\beta = .160, p = .001$ ), and pleasure (standardized  $\beta = .276, p = .009$ ). Confusion negatively predicted feeling highly moved (standardized  $\beta = -.150, p = .001$ ), as did disgust at a level only nearing significance (standardized  $\beta = -.080, p = .09$ ). Intensity of feelings of joy and sublime proved unrelated to feeling moved. (We note that it is possible that participants did not understand the meaning of sublime.)

When we investigated whether any of the nine evaluative/emotional intensity scores predicted an introspective response (either cognitive or emotional), results looked different. The overall regression model was statistically significant,  $F(9, 398) = 4.39, p < .001$ , with an  $R$  squared of .09. However, the relationships between evaluative/emotional intensity scores and introspection did not mirror those between the intensity scores and feeling moved. The only intensity scores associated with introspection were fear (positively associated, standardized  $\beta = .220, p = .001$ ) and confusion (negatively associated,  $\beta = -.220, p = .001$ ).

### **Discussion**

To our knowledge this is the first direct test of the putative connection between intense aesthetic experience and inward directed thought. Unlike in the study

by Vessel, Starr, and Rubin (2012), in which level 4 of feeling moved was differentiated from all other levels, we found here that levels 3 and 4 combined were differentiated from levels 1 and 2 combined. This occurred because our participants did not give very many 4 ratings. Perhaps this difference cultural, with Chinese participants less inclined to give extreme ratings. On the other hand, Vessel's study included only 16 participants, and therefore our finding may in fact be more generalizable. Clearly this discrepancy can only be resolved by further research.

How well do our findings support the inference made by previous researchers that aesthetic experience is related to inward directed thought? If we compare frequency of introspection between high and low levels of feeling moved, we see that introspective responses were more likely when participants reported high (rather than low) levels of feeling moved. However, introspection also occurs during low levels of feeling moved. And non-introspective responses occur as often as introspective ones at high levels of feeling moved. Therefore, we must conclude that the relationship between introspection and intense aesthetic experience is a modest one.

It is possible that findings from Chinese participants do not generalize to Western ones. Perhaps there are cultural differences in the interpretation of powerful, pleasing, and moved – words in the rating instructions. Perhaps there are cultural differences in the inclination to introspect. Whether there are cultural differences in the tendency to be moved by art, or to introspect when moved, would need to be addressed in further research.

A hypothesized relation between intense aesthetic experience and introspection can be framed in a strong or weak way. According to a strong hypothesis, intense aesthetic experiences should always involve introspection. According to a weak version of this hypothesis, intense aesthetic experience should be more likely to involve introspection than less intense aesthetic experience. The strong version, we maintain, is too simple and is simply implausible. The weaker version is plausible and the results reported here provide support for this more modest version. The weaker version is also entirely consistent with the fact that the DMN does not have a one-to-one relationship to inner direct thought. The DMN has been implicated not only in self-referential thought but also in thinking about others' mental states (Mars, Neubert, Noonan, Sallet, Toni, & Rushworth, 2012). And recent studies have shown the DMN to be associated with the processing of feeling surprised (Brandman, Malach, & Simony, 2021) as well as with the sense making over time (Yeshurun, Nguyen, & Hasson, 2021). What Raichle wrote in 2015 -- that we do not yet have a full understanding of the functions of the DMN -- remains true today.

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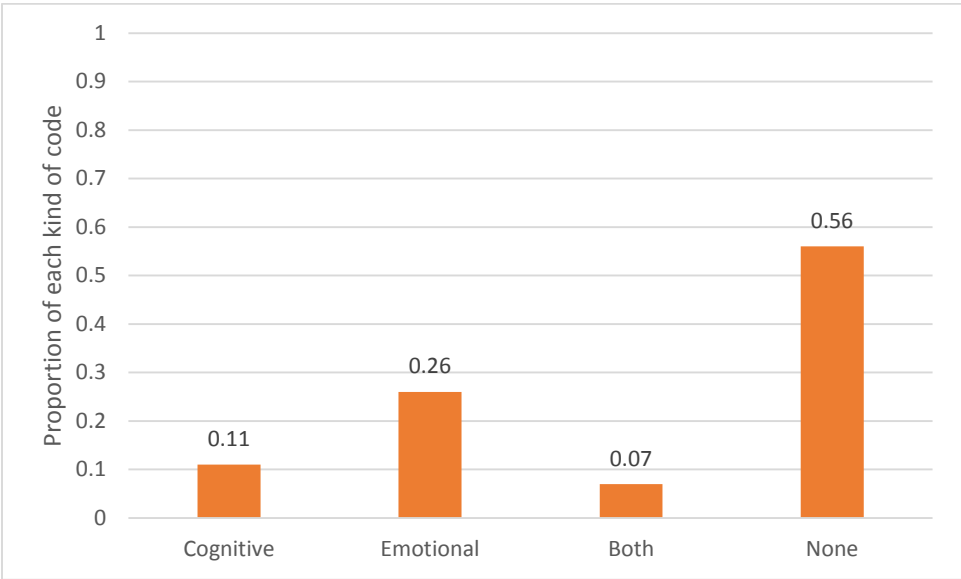
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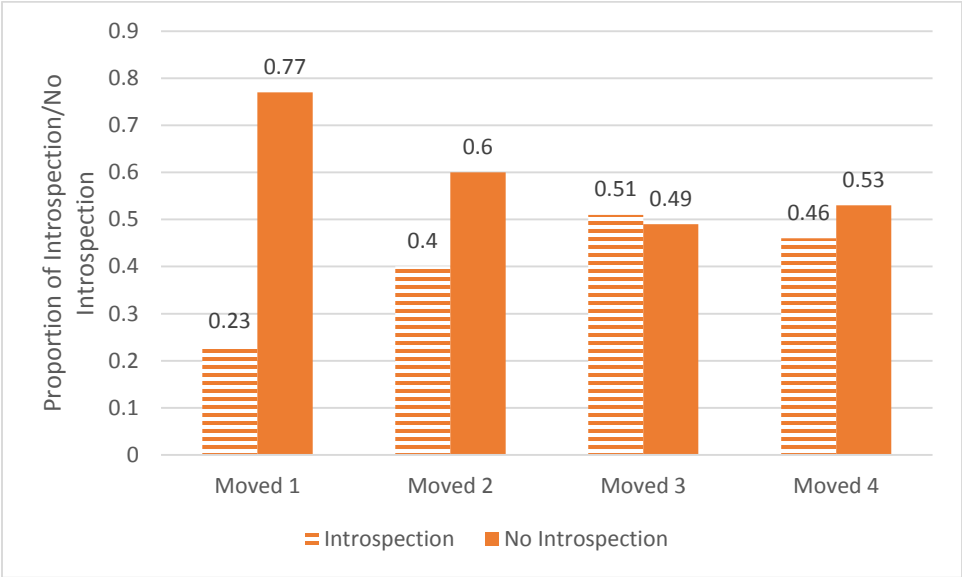
**Figure 1**

*Proportion of Each Kind of Code*



**Figure 2**

*Proportion of Introspection/No Introspection Responses for All Four Levels of Moved*



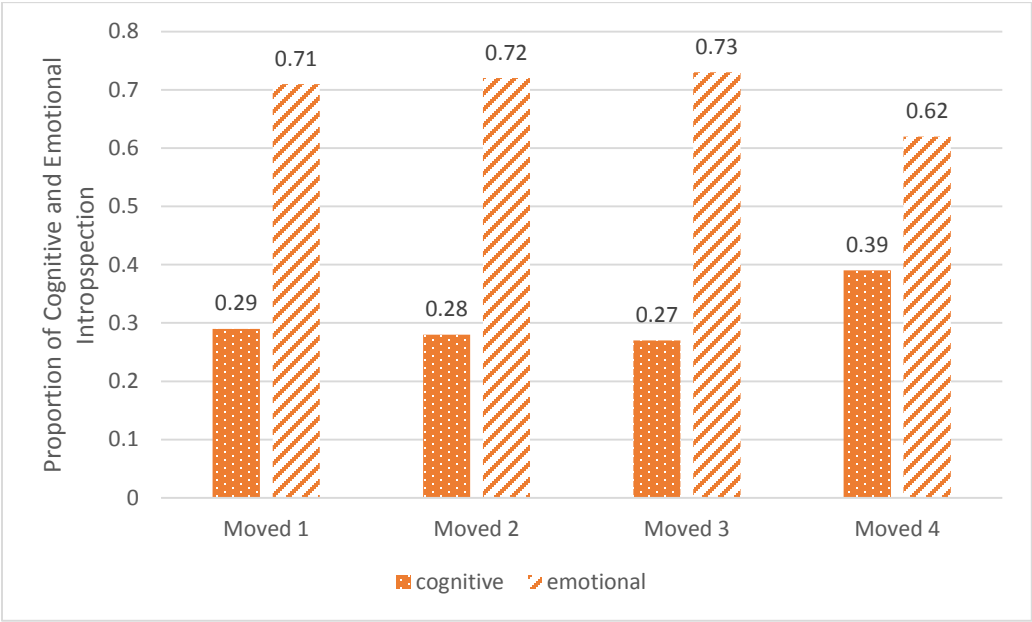
**Figure 3**

*Proportion of Introspection/No Introspection Responses for Low (1-2) and High (3-4) Levels of Moved*



**Figure 4**

*Proportion of Cognitive and Emotional Introspections at Each Level of Moved*



**Table 1***Sample Responses for Each Type of Code*

Code	Examples
Cognitive Introspection	Make me think of my hometown and autumn. Her face reminds me of an actress in a movie whose eyes have a sense of determination.
Emotional Introspection	I personally love warm and sweet moments. In this picture, the mother and the baby are playing toys together which gave me a safe and comforting feeling. I feel that the boat is surviving a heavy storm and I'm worried about the fate of the boat.
No introspection: Describes content	This painting is describing a windy day with trees being blown bending and people walking in the wind. I think it describes a chaotic scene. The woman's hair had been carefully woven, and her fair skin color showed youthful vitality, especially accompanied by the bright red coat. Hair accessories are decorated with bright beads.
No introspection: Describes inner state of person in painting	It looks like just a self-portrait sketch. I kept on thinking he's bored. Thinking more, he might be a little bit sad too, but mainly just bored. The woman in the middle, with her mouth opened slightly, has numbness, tiredness, sadness in her eyes. The man to the right of the woman seems very mad.
No introspection: Describes feeling expressed	A lovely child with her mother and bright colors in bedroom make the whole picture warm. The scene is full of beauty and peace.
No introspection: Interprets meaning	The image is both beautiful and abstract. It looks like a boat in a storm. But somehow I see a glimpse of hope. The whole picture is also dominated by warm tones. The temperature of mother-child bonding is reflected.

