MORE ON THE MODEL OF AESTHETIC APPRECIATION AND AESTHETIC JUDGEMENTS

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Abstract. This article discusses the evolution, applications and future of the information-processing stage model proposed by Leder, Belke, Oeberst, and Augustin in 2004. The model is described and summarized in section 1.

The model has been expanded since its introduction. A extended version of the model is presented in section 2. I demonstrate how to use the extended model to increase the understanding of certain aesthetic problem and even to another kind of problem in section 3. This gives the motivation to further improve the model.

I believe that results from neuroesthetics will help to verify and refine the model. Hence, I correlate the information-processing model with a neural interaction model of aesthetic processing, aiming to be a framework for future researches in section 4. Possible future researches are presented in section 5.

1. Summary

Due to the dominance of style over content and even to the disappearance of content, modern and contemporary art provide more cognitive challenges than before. Conventional study on aesthetics from psychology perspective focusing on visual perception seems insufficient to cover this distinctive feature. The cognitive-processing stages involved hence should be considered for a complete understanding of aesthetic experiences.

In [10], Leder et al. propose an inforamtion-processing stage model of aesthetic processing in order to understand how modern art provides aesthetic experiences, with a focus on visual art (Figure 1). The model suggests that aesthetic processing goes through the five stages:

(1) perceptual analyses
(2) implicit memory integration
(3) explicit classification
(4) cognitive mastering
(5) evaluation

and produces aesthetic emotion and aesthetic judgements as outputs .

By this model, we can see that it is the cognitive process with the continuously upgrading of affective states forms a aesthetic experience. Below is the the description of each stage.

Context and inputs. The two inputs to the model are an artwork and the affective state of a perceiver.

Pre-classification of an object as art is often required for that object to be seen worthy of aesthetic processing. This can be done by providing certain contextual

Date: April 13, 2022.

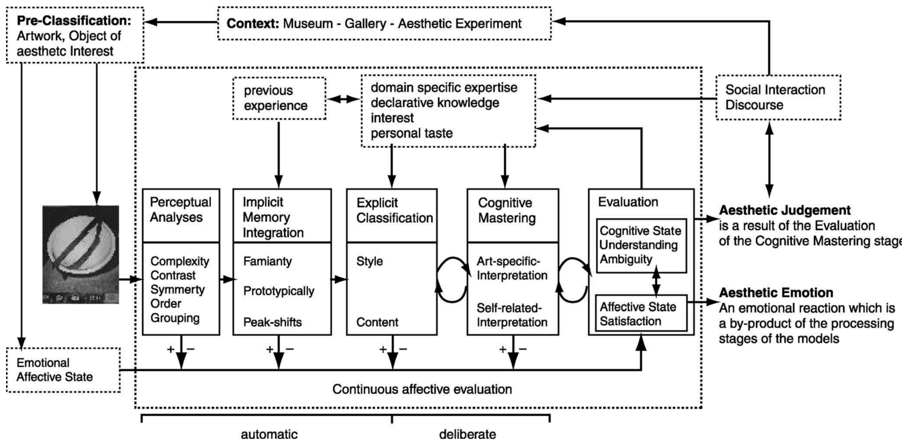

FIGURE 1. The model of aesthetic experience from [10]

information such as the appearance of the object in art exhibition. Contextual information is especially significant for the processing of contemporary art where the border between art and non-art is often unclear.

Aesthetic experiences are thought to be affectively positive [5]. Also, affective states will influence cognitive processing [3]. These stress the importance of considering the perceiver's initial affective states for complete analysis of aesthetic experience.

Perceptual analyses. Different perceptual variables have been investigated, including contrasts, visual complexity, intensity, brightness, saturation, size, color, grouping, and order. However, those variables only affect simple judgments with respect to aesthetic preference.

Implicit memory integration. It was found that artists often use features that are processed at this stage, exploiting processing means of human perceptual system [17, 22]. There are three features considered in [10]:

- *Familiarity* through repetition has been found to increases the affective preference with the 'meta-exposure' paradigm[9, 21].
- *Prototypicality* is the amount to which an object is representative of a class of objects. It is hard to measure due to the reliance on individual experience.
- *Peak-shift* effects describe stronger responses to objects that exaggerate the properties of familiar objects. [22] identifies the function of art as searching essential features. The emphasis of some particular features triggers those searching.

Note that the processing results in this stage need not be conscious to have effect on the aesthetic processing.

Explicit classification. This stage involves the analysis of content and style. Unlike previous stages, the analysis process is intentional and can be explicitly expressed.

Expertise of the perceiver affects the outcome of explicit classification. Comparing expert and naïve's perception provides evidence of this stage. The effects of expertise in psychological aesthetics has been analyzed in [2].

With the development of modern art's various and individualized style, it is evident that aesthetic experiences involves processing of style. This is especially significant in abstract art, where objects can be only differentiated on style.

Art also provides *pleasure of generalization*. [6] has argued that the generalization of knowledge to unknown styles might be important to aesthetic appreciation.

Cognitive mastering and evaluation. The last two stages, cognitive mastering and evaluation, form a feedback-loop. The results of cognitive mastering is continually evaluated in evaluation stage until remaining ambiguity is acceptable and a satisfying understanding of the artwork is achieved.

These stages stress the importance of understanding, which captures a distinctive feature of modern art: a need to interpretation. It has been stated in many works that understanding of an artwork activates the rewarding center in the brain [11, 17, 22].

The expertise and personal taste of the perceiver affects the processing loops. Naïve perceivers often apply self-related interpretation such as associating the artwork with their own situation, while experts tend to interpret art-specific information such as style. The effect of the amount of top-down knowledge, such as the artists' backgrounds, is also described.

Affective states. Aesthetic experience is also believed to be affective. The result of each stage of the model can increase or decrease the affective of the perceiver. The model also assumes that the perceiver can continuously evaluate its affective state during the cognitive processing and stops once a satisfactory state is achieved.

Outputs. The model produces *aesthetic judgements* and *aesthetic emotion* as two distinctive outputs. The later one relies on the affective effects and the subjective success of the information processing. The more satisfactory about the results causes the higher probability of pleasure or happiness.

Aesthetic judgments are claimed to be the result of the measurements in the evaluation block. These require the (subjective) success in the cognitive mastering stage.

The distinguishing of the two outputs is critical to empirical studies. Naïve perceivers tend to blur the two outputs. Moreover, past researchers often measured aesthetic judgments after an incomplete processing of an object. Those judges then is assumed to be based on the affective states.

2. Extension to the Model

Since the introduction of the previous model in 2004, empirical aesthetics has dramatically progressed and the model has been refined in [15].

[15] proposes an extended version of the previous model, Vienna Integrated Model of Art Perception (VIMAP), with a focus on incorporating bottom-up and top-down processes of the appreciation of art. I particularly describe the part that involves top-down processing: cognitive mastery. The model is illustrated in Figure 2.

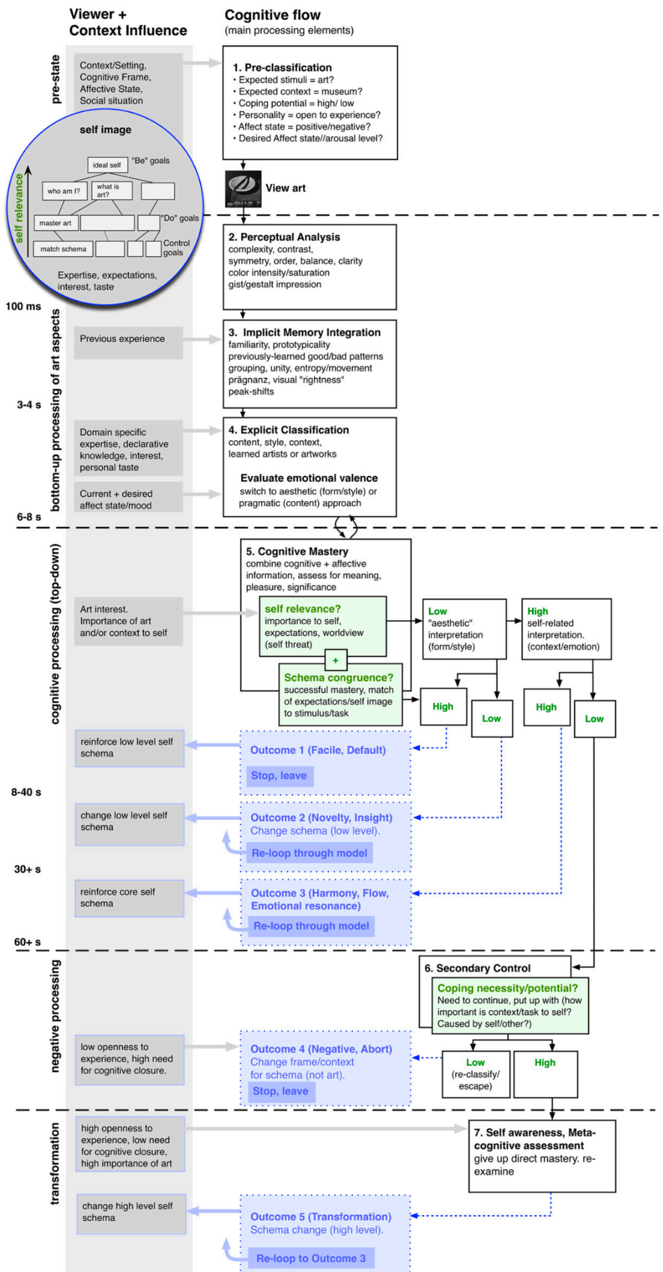

FIGURE 2. Extended model of aesthetic experience from [15]

VIMAP organizes pre-classification components in a hierarchy structure as shown in the top-left inset of Figure 2, which represents a viewer's *ideal self image*, composed by all postulates and expectations held by that viewer. The higher level is a collection of ideal traits and concepts ("Be goals") such as 'be an artist'. The lower consists of more specific "Action goals" for behavior and perceptions that is believed to fulfill the higher goals such as 'understand a particular artwork'.

During cognitive mastery, the perceptual and contextual information would be combined in order to match to the initial self image (schema). Specific outcomes rely on positing two checks:

- *schema congruence*: Does the information match with the (lower level of) prior self image?
- *self-relevance*: Whether the art is important to the perceiver's self (higher level of self image)?

The results of the two checks, with another *coping check* described below, determine 5 different outcomes of the model. High congruence with low self-relevance causes facile outcomes and often the viewer will stop and leave the model (1). High congruence with high self-relevance means that the artwork resonates the viewer's personal identity, strengthening the viewer's core self schema (2). Low congruence with low self-relevance will provide novelty and small insight; the viewer might modify the low-level schema to fit better with the art (3).

In the case of low congruence with high self-relevance, it requires another coping check to solve. If the viewer decides not to proceed, he would have negative experience due to the threat to self (4). For viewers with high coping need, they would adopt a meta-cognitive approach to their interaction and create new approaches or schemata which will permit more harmonious processing (5).

3. Applications of the Models

In this section, I apply the VIMAP model to increase understanding of a model that cope with a problem on aesthetic liking, hence strengthening comprehension of that problem. I also use the model as a solid foundation to make the discussion in [16] more formal, triggering future researches on creating AI artist. The feasibility of model on solving various problems provides motivation for further improvement.

3.1. **The Pleasure-Interest Model of Aesthetic Liking.** There are some works confirm that people prefer a moderately arousing challenges [12]. Nonetheless, there are also results confirm that people prefer objects that are easily processed [4].

To resolve this confliction, [7] proposed a dual-processing model, called the pleasure-interest model. The model consists of tow forms of process: *automatic processing* and *controlled processing*.

Automatic processing is stimulus-driven and results in pleasure-based liking. In this case, people prefer easily processed objects. Controlled processing is perceiver-driven and occurs only when the motivation is sufficient. This then leads to interest-based liking, where more challenging objects are preferred. Using VIMAP model can provide more insights on these results.

The automatic processing corresponds to the perceptual analyses stage, implicit memory integration stage, and explicit classification stage. Controlled processing corresponds to cognitive mastering stage. The motivation is considered through the ideal self image so that whether the controlled processing be activated depends on self-relevance and schema congruence.

An artwork is deemed challenging if low schema congruence occurs during initial cognitive mastery. With that in mind, I argue that while the artwork is not self-relevant, a perceiver will proceed only if he believes that slightly modify its low-level schema or obtain a little more information about the artwork. Simply, he prefers easily processed one. On the other hand, a perceiver will likely seeks challenges from self-relevant artwork, since solving that would results a harmonious solution. However, if it is extremely challenging, that would cause negative experiences. This should explain why moderate one is preferred.

3.2. **Analysis of Perceiver.** In [16], Peng tries to find the capacity to become an artist by comparing the difference of perceiver's viewpoints on a machine-generated artworks between the case that the machine's design is disclosed to the perceiver and the case that the design is hidden. The model of perceiver's processing of artwork used in [16] lacks justification and is rather informal. The description can be rephrased with the VIMAP model.

I first consider the case that a perceiver is agnostic about the design of the machine. This perceiver can be fooled that the machine has human-level intelligence. Hence, the cognitive processing of a machine-generated artwork is the same as one created by human.

While the machine's design is disclosed, it becomes a perceiver's top-down knowledge. This makes processing solely on its artworks always producing facile outcomes, resulting from high schema congruence with low self-relevance. This might trigger people to search cognitive challenge on understanding the machine, that is, to pre-classify the machine rather than what it generates as art.

The difference of the two cases are where perceivers search the meaning from. I argue that those credit authorship are those that are believed to provide cognitive challenges. For that to happen, they must have the capacity to have the intention to create art, to organize the creating process, and to provide meaningful adaption in the artwork. The later two requires some self-awareness about their own thought. It has been suggested in [16] that having the intention also results from this self-awareness, but this requires verification.

4. Neuroesthetics

Neuroesthetics is a subdomain in aesthetics that studies the neural activity and brain mechanism behind aesthetic experience. I believe that understanding the neural activity might be helpful for future validation and improvement of the model. Actually, each stage of the VIMAP model has been associated with specific brain regions that account for the information processing in [15].

However, recent researches in neuroscientific suggest that art is not special and aesthetic valuation is just a form of rewarding processing [18]. It is argued that aesthetic experience results from a general sensory valuation, instead of a special neural activity. Besides, it is proposed that "aesthetic" should be reclaimed as the description of a set of general and ordinary neurobiological phenomena.

To embrace this research trend, I correlate the VIMAP model with the neural interaction model of aesthetic appreciation from [19].

The Neural Interaction Model of Aesthetic Appreciation. The neural interaction model is illustrated in Figure 3 and described below. In the model, the perceptual information of a sensory object will be transferred into the reward circuit.

The reward circuit then computes a hedonic value on the object, according to behavioural task demands and homeostatic needs, that are represented by executive signals and interoceptive signals immersive in the neurons of reward circuit, respectively. The hedonic value then might appear in the form of an affective response.

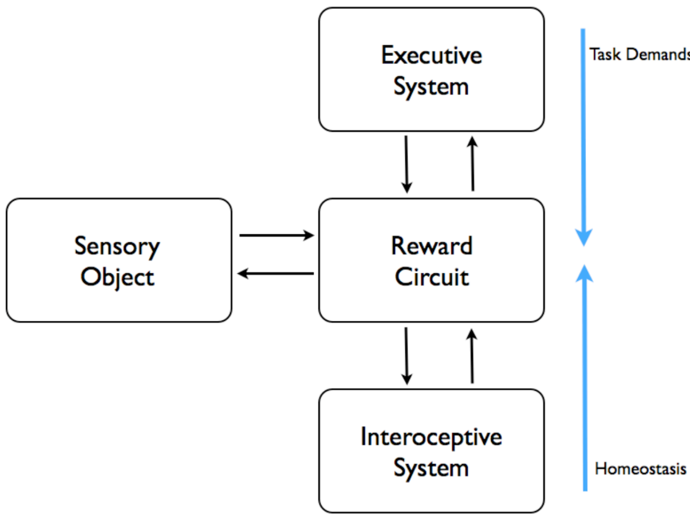

FIGURE 3. Neural interaction model of aesthetic appreciation from [19]

Correlation with VIMAP model. I assume that the processing described above corresponds to the cognitive mastering and evaluation stages in VIMAP model, where the perceptual information combined with other top-down information is analyzed to fit with the perceiver's schema to determine whether satisfaction has be achieved.

According to the above analysis, I presents the correlation of the two models as shown in Figure 4. To the left of the figure, the information obtained includes not only perceptual information but also those learned from implicit memory integration and explicit classification, and also top-down knowledge.

The perceiver's low-level schema determines specific action to achieve chosen goals, which belongs to executive function. Hence, I claim that it is coded into the signals from executive system. The high-level schema is more about 'self', which might be sensed by interoceptive system [8].

The reward, a hedonic value, is computed based on the fitness of the information with the schema, i.e. schema congruence and self-relevance. Notice that this process will execute many times until acceptable reward is produced, as in the original model such that the cognitive mastering and evaluation forms a feedback-loop that would end when satisfactory result is achieved.

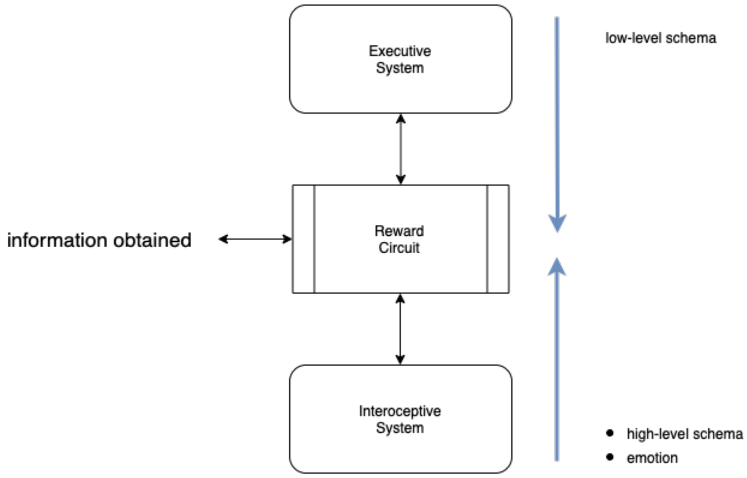

Figure 4. Correlation of VIMAP and the neural model

5. Future Works

The correlation described above provides a potential framework for further researches on the neural activity of aesthetic processing, despite that it requires more evidences from neuroscience to verify.

For example, some believes the cognitive appraisals of aesthetic processing focus more on the context than non-aesthetic one, despite the same networks interaction in the brain [1]. By the above model, this might results from the difference in schemata that could be observed in executive and interoceptive signals.

I also expect there will be more models that deal with certain aspects of aesthetics. Comparing with those model might be helpful to find the limit of the current model and to trigger further investigations.

The VIMAP model focus mostly on visual perspectives. Generalization of the model to the other forms of objects is another line of researches. I think that general neural activity behind the cognitive process will be great resuoruces for that.

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