

PREDICTING THE ARTWORK'S BEAUTY: ELEMENTS OF PREDICTIVE AESTHETICS

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ABSTRACT

This paper presents the findings of an experiment conducted in an innovative way through the use of the most popular social network: Facebook. Exploiting the system of “like” and “share”, on which this online platform is based, thousands of artwork images were submitted to a sample of over 10,000 users worldwide. Through the metrics analysis related to the aesthetic choices expressed by the users, it was observed that viewers are inclined to react in the same way towards certain visual stimuli coming from the artworks: some compositional elements inside the artworks are able to drive the aesthetic preferences towards some artworks rather than others. Therefore it may be possible to predict the aesthetic reactions from the public introducing specific *responsive* elements inside the artworks, able to influence beforehand the aesthetic preferences.

Keywords: Psychology of Art, Visual Arts, Neuroesthetics, Perception, Aesthetics.

INTRODUCTION

Is it possible to identify the compositional elements inside an artwork that are able to activate the brain areas responsible for the Beauty recognition, and to induce the Aesthetic Pleasure in the viewers? Maybe all of us are driven by a specific form of aesthetic determinism when we admire and appreciate an artwork? If we were able to predict the aesthetic preferences of the public towards an artwork, maybe could we talk about *Aesthetic Precognition*? Some positive feedbacks came by analyzing the aesthetic choices from the public towards several artwork images posted on Facebook. In fact, this paper anticipates some findings of an empirical study – still in progress – that we are conducting in an *unconventional* way through the use of the most popular social network in order to explore a new field of investigation based on the intersection among Psychology of Perception, Neuroesthetics and Information Technology.

METHOD

To get our reference sample, we opened three identical personal profiles on Facebook, on which we posted - every day for three years - several images of contemporary artworks, specifically in the form of sculptures and installations, created through many different artistic techniques by artists from around the world.

The analyzed sample was constituted by the contacts aggregated to each profile, that were divided into two clusters based on the level of expertise in art: naïve viewers (namely: untrained in art) and art experts (namely: artists, curators, critics, gallerists), both coming from around the world. In the course of three years we posted thousands of artwork images, and two profiles of three have reached the limit of 5,000 contacts imposed by social network, due to the large number of friends requests, attracted by the

images. Therefore our research has focused on a sample consisting of over 10,000 users worldwide (unaware of being involved in the experiment), to whom over 15,000 artwork images have been submitted with the aim to evaluate the aesthetic preferences, expressed by the viewers through the “like” and “share” system, typical of Facebook.

We have carefully evaluated metrics, analytics and folksonomies provided by the social network related to the aesthetic preferences of the viewers, that is the quantitative data obtained in terms of “like” and “share” from the users, as well as the user engagement percentages achieved by each artwork, which expresses rather accurately the aesthetic orientation of the viewers, analyzing and segmenting the artworks' characteristics, and identifying the occurrences of specific compositional elements compared to the aesthetic preference peaks determined by the choices of the public.

The experiment has confirmed that the perceivers, with no significant differences between the two clusters of viewer (art insider or non-insider) and their nationality, have been somehow attracted by the same kind of images and by the same combinations of compositional elements (shapes, colors, spatial layout, etc.), reacting the same way to same aesthetic stimuli, so that when we have proposed afterwards other different artworks in accordance with the aesthetic choices previously given by the viewers, it has been possible to predict rather accurately what would have been their possible aesthetic preferences towards the artworks before these were shown.

Although there was no contextualization of the artworks inside a three-dimensional exhibition space, such as an art gallery or a museum – in fact artwork images are shown in bidimensional mode through the computer screen (similar to live viewing of a painting) - the experiment has given back anyway a rather accurate idea of what are the *responsive* compositional elements inside the artwork able to activate the aesthetic pleasure in the perceivers, unlike the fMRI (Functional Magnetic Resonance Imaging), that has allowed to describe until now only the brain modifications and identify the cerebral areas connected to the aesthetic pleasure under the influence of specific visual stimuli [1], without however deepening the influence of specific *responsive* elements inside the artworks, that are able to activate the Beauty recognition, inducing a specific aesthetic behaviour from the public.

Indeed, during this study, it has been possible to isolate some well-defined categories of compositional elements within the artworks that, if combined in a precise way, could activate the aesthetic perception and drive the preferences of the perceivers towards artistic objects that meet such compositional characteristics, so that during the experiment we have been able to predict with reasonable accuracy which artworks the public would have preferred afterwards. In fact, thousands of artwork images having those identified compositional characteristics have been subsequently repropose several times and the preferences of the viewers have been exactly what we expected, confirming that those compositional items are able to control the activation of Aesthetic Pleasure, stimulating and activating the brain areas connected to the Beauty recognition, influencing thereby the aesthetic choices of the viewers, and inducing specific reactions from the public. As a countercheck, we have proposed several artwork images in which, intentionally, those *responsive* elements were absent: as expected, the percentages of preferences towards these artworks have been very low. This has allowed to confirm that certain specific compositional elements inside the artworks play as attractors of the Aesthetic Pleasure, enabling the Beauty recognition and the orientation of aesthetic preferences of the perceivers towards an artwork rather than another, bringing about the

prediction of a precise aesthetic behavior from the public, contrary to a fully subjective interpretation or judgment about the Beauty and Aesthetic Pleasure [2].

RESULTS

As already noted by the latest research in the field of Neuroesthetics, "human beings are endowed with species-specific mechanisms that resonate in response to certain parameters present in works of art" [1]: keeping in mind the symbolic and evocative appeal of an artwork, and the conditioning exercised by the subjective aesthetic experience, cultural background, personal values, emotions and by specificity of the individual memories of each perceiver [2], that certainly could determine a subjective and changeable judgment about the Beauty, we have observed that the Beauty perception and the emergence of Aesthetic Pleasure have been activated more frequently in the presence of specific *responsive* elements inside the artworks.

Through this experiment it has been possible to identify those compositional items by means of an accurate data gathering related to their occurrence and frequency into the artworks, and to the preferences and aesthetic choices by the viewers.

Some of the *responsive* elements capable of activating the Beauty recognition and stimulating the Aesthetic Pleasure in the viewers, isolated through this experiment conducted by the use of Facebook, are:

- the black / white contrast;
- specific shapes and their layout or compositional equilibrium;
- the presence of regular geometries;
- certain combinations of bright colors or, on the contrary, a smooth color gradation and soft tones;
- the interaction, correlation, concordance, simplicity, balance, linearity, symmetry and harmony of the compositional elements inside the artworks;
- the presence of red color;
- the multiplication or repetition of elements identical to themselves;
- the presence of evanescent, evocative or surreal elements;
- the Golden Ratio or *sectio aurea*, namely the proportion of compositional elements expressed by the value $\Phi=1:0.618$ [3];
- the presence of no more than three visual items or defined groups of figurative elements to be decoded;
- the presence of perfect circles or circular and rounded shapes;
- the miniaturization of the compositional items;
- the specific location of an artwork inside the exhibition space and into the fruition context (such as a gallery, museum, or urban space);
- the importance of light as a function of iconographic grammar and syntax of an artwork;
- the representation of semantic contrasts or paradoxical juxtaposition; a modulated and not too sharp deviation compared to the canonical images of artistic beauty;
- an unexpected deviation from the rules of spatial perspective, reconstructed normally by the viewer through the rules of perceptual constancy (according to *Gestalt Psychology*);
- the reference to the known forms of reality; the presence of images that recall dynamism and movement.

As recently demonstrated by in-depth investigations conducted through the use of neuroimaging techniques (fMRI), some of the above items are indeed capable of stimulating the right hemisphere and prefrontal cortex of the brain [4], but we have observed that such compositional elements are also able to induce precise aesthetic behaviours, conditioning, orienting, directing and driving the aesthetic preferences of the viewers towards certain artworks rather than others, activating the Beauty recognition and the Aesthetic Pleasure of the public. We believe even that, if such elements were found all together in a specific display context, in the presence of neurophysiological predisposed individuals, they would be able to cause a perceptible shock or aesthetic breakdown in the perceiver, known as *Stendhal syndrome* [5].

As argued by E. H. Gombrich [6], the factors that determine the aesthetic experience are inherent in our biological inheritance, even if we are not able to give them a conscious explanation. Towards specific visual stimuli, the aesthetic judgment seems to activate and “resonate” in the same way inside all the perceivers worldwide: it’s like if the viewer, admiring an artwork having those specific characteristics, discovered something already known, a kind of immanent principle of Beauty, that C. G. Jung called *Archetype* [7]. In fact, we have detected the same typology of aesthetic preferences by most viewers of the both analyzed clusters (expert or non-expert in art) exposed to the submitted artwork images: the systematic and steady repetition of the same aesthetic choices towards certain artwork groups has shown that there are some specific compositional elements inside the artworks able to activate the Beauty perception and Aesthetic Pleasure in the perceivers. The responses by the viewers towards the above compositional elements seemed to be similar for each individual, so that it has been possible to predict the following preferences from the public towards not yet submitted artworks. We have defined this phenomenon as *Aesthetic Precognition*, that is the possibility to predict in advance the aesthetic choices of a viewer towards a group of artworks before this has been shown, or, for those individuals who have learned to recognize the *responsive* compositional elements inside the artworks, the specific ability to identify beforehand the structures of the artwork Beauty: in fact, the knowledge of these *responsive* structures would make possible to foreknow what might be the aesthetic preference of a viewer towards an artwork group.

The *Aesthetic Precognition* has nothing paranormal or esoteric, because that is connected to neurophysiological and biochemical mechanisms of the brain and to the human perception dynamics, according to which the men realize the concept of Beauty, that would be only apparently subjective, and feel attracted or fascinated by a given artwork rather than another [8]. Probably the concept of Beauty, that form and organize the human perceptual experience towards the artworks, is biologically and genetically predetermined, as if it had been inscribed by ever in the human DNA [9].

In our opinion, the process of brain assimilation of the artwork images is probably supported by the mirror neurons, that have *fixed* these images over time introjecting them like a computer memory: in the course of human evolution, this psychobiological process has helped to build a sort of psychic system of Beauty recognition, supporting the development of the brain receptors of Aesthetic Pleasure, that now are able to react almost automatically and in *reflected* way towards the artworks (or their images), making *predictable* the public reactions: Beauty would be therefore a selective and hereditary trait of the human evolution. The *Aesthetic Precognition* is basically a specific form of *aesthetic determinism* (or aesthetic perceptual conditioning), through which the preference of an individual towards an artwork might be predicted or even

predetermined: according to this perspective, it would be then possible to know in advance whether a given artwork might like or not to the viewers, or create artworks able to induce the Aesthetic Pleasure with the aim to condition the aesthetic preferences of the public [10]. Here is a new form of *Aesthetic Cognitivism*, based on the *precognition* of behavioral aesthetic reactions by the perceivers.

CONCLUSIONS

For centuries men have questioned about the concept of Beauty and its nature, but it is possible that the Beauty is based on the brain neural structures, that nowadays can be explored and analyzed in depth [11], [12]: if Neuroesthetics has made possible to identify - through the neuroimaging technologies such as the fMRI - the brain areas activated during the viewing of an artwork, the research we are still carrying out is allowing to track and identify the path of Beauty perception and the *responsive* compositional elements of the artworks that can stimulate the emergence of Aesthetic Pleasure in the perceivers. This perceptual process has been highlighted by steadily repeated aesthetic choices of the viewers towards the artworks submitted during the experiment, that are certainly connected to the psychobiological mechanisms of human perception [13], [14].

Thanks to the study of those *responsive* compositional elements inside the artworks, the analysis of aesthetic behaviour experienced by the viewers, and the support of Neuroesthetics, which analyzes the neural mechanisms involved in the aesthetic perception, we might be able to develop a psychological theory of aesthetic behavior, linked on one hand to the neurophysiological mechanisms of the human brain, on the other to the cognitive processes, without neglecting the role playing by the individual unconscious. A further development of this theoretical model could allow to elaborate an *Aesthetic Algorithm* able to identify beforehand the public reactions towards the artworks, leading to the creation of *aesthetically perfect* artworks, capable of activating anytime the aesthetic pleasure in the viewers on the basis of a premeditated project by the artist: an *Aesthetic Algorithm* able to predict rather accurately the aesthetic choices and preferences of the public towards the artworks, before they are displayed to the perceivers. According to this *algorithm*, an artist would even be capable of modulating *the share of Beauty* to be included within the artwork, with the aim to induce specific reactions and emotions in the viewers, acting on the basis of a *Predictive Aesthetics*: a sort of subliminal, planned and premeditated aesthetic conditioning, able to influence, orientate, direct and drive the aesthetic preferences of the public. The predictive analysis of the artwork's Beauty, based on knowledge of compositional elements that can stimulate the Beauty recognition and activate the Aesthetic Pleasure in the public, might allow the artists to operate according to the *Aesthetic Precognition*, to such an extent to modify their artistic creativity in order to influence the aesthetic choices of the viewers. In fact, it is possible to develop a *Precognitive Aesthetics* based on the prediction of aesthetic tastes and preferences of the public towards the artworks, but also to build a specific technique of *aesthetic persuasion* able to provide artists with know-how through which activating the brain areas responsible for the Beauty recognition, inducing the emergence of the aesthetic pleasure in the viewers: the knowledge of the reaction mechanisms of the brain's perceivers towards specific aesthetic configurations, shapes or colours inside the artworks, would allow to force and drive the aesthetic appreciation of the public in predetermined way. In this case, the spontaneous process of creativity by the artist, unaffected expression of spontaneous emotions, could turn into a

intentional ability to catch in a *premeditated* way the aesthetic preferences of the public, activating the desired reactions from the viewers: the creative work of the artist could turn into aesthetic predetermination, by creating pieces of art *predestined to be beautiful*. Indeed, founding a predictive aesthetics might be somewhat dangerous: the possibility of making a deliberate and artificial Beauty construction, and the ability to attract and condition successfully the aesthetic preferences and choices from the public, based on the foreknowledge of the *responsive* compositional elements inside the artworks, responsible for the activation of Aesthetic Pleasure, might become a new artistry or an effective technique strategically learned by the artist with the aim to influence the aesthetic judgment of the viewers, inducing an *aesthetic premeditation* capable of inhibiting and influencing the creative freedom, bringing about a leveling and standardization of the artistic production on a *steady beauty*, a sort of *white noise* that may stifle the spontaneous expression of the artistic creativity. In fact, the creative inspiration and *impetus* that drive the artist might be affected, conditioned and distorted beforehand: through the foreknowledge of brain activation mechanisms of Aesthetic Pleasure, the artist could become the creator of a conscious, intentional and premeditated aesthetics, subtracting the artwork from its status of *autonomous set* of meanings, susceptible to subjective interpretation by each individual.

The *Aesthetic Precognition* is certainly an interesting research perspective from a scientific point of view, because it is situated at the intersection between Experimental Psychology and Empirical Aesthetics, but this new search field might upset the dynamics of value assignment to the artworks, giving more importance to the aesthetic judgement of the public, influenced in premeditated way by the artist through the *Aesthetic Precognition*, rather than to the art experts, eventually revolutionizing the whole Art Market. In fact, the possibility of establishing a *Precognitive Aesthetics* might be dangerous for the current Art System: a predictive formula of the artwork's Beauty might influence not only the aesthetic judgment of the public, but also the same creative work by the artist. The artistic talent might be built on the *precognition* of the aesthetic preferences of the public: thanks to the knowledge of the compositional elements able to influence the activation mechanisms of Aesthetic Pleasure, artist could be capable of creating *ever-beautiful* artworks in order to satisfy and gratify the aesthetic tastes of the public worldwide all the time [15]. The *Aesthetic Precognition* might therefore influence the creative freedom, inducing the artist to create artworks according to these *predictive* criteria. Through the *Aesthetic Precognition* an artist might perfectly suit the tastes of the public, predicting, anticipating and predetermining the aesthetic choices of the viewers, with the aim of achieving the universal and absolute Beauty. This *Beauty-centric* process of attribution of the artwork's value may be able to create a different market value for the artworks, or even change the value assigned so far. In fact, the creation of a new economic value for an artwork, based only on its real and objective Beauty recognized by the public, at not only by the art experts, besides modifying the creative *modus operandi* of the artist, could also revolutionize the conventional rules of assignment of a value to an artwork, and the evaluation criteria based on the judgment by the art influencers, such as critics, curators, art dealers, and gallery owners who manage the Art Market nowadays, not always corresponding to aesthetic criteria. Therefore the *Aesthetic Precognition* could represent a threat to Creativity, which through the foreknowledge of the activation techniques of the Aesthetic Pleasure might be influenced, conditioned and distorted, making the artist less free and spontaneous, and reducing Creativity to a mere behavioral marketing operation

that aims to capture the public favor, with the result of determining a precise orientation of the artistic creativity. But, on the contrary, *Aesthetic Precognition* could also represent an opportunity for enrichment of the artistic and creative knowledge. Our investigation is not over yet, but it is only at the beginning: next step will be to identify the *Aesthetic Algorithm* able to describe in mathematical terms the process of Beauty recognition and the activation mechanisms of the Aesthetic Pleasure in the viewers.

REFERENCES

- [1] Di Dio C., Macaluso E. & Rizzolatti G., "The Golden Beauty: Brain Response to Classical and Renaissance Sculpture", *PloS ONE*, vol. 2 (11), e1201. doi:10.1371/journal.pone.0001201, 2007.
- [2] Reber R., Schwarz N. & Winkielman P., "Processing Fluency and Aesthetic Pleasure: Is Beauty in the Perceiver's Processing Experience?", *Personality and Social Psychology Review*, vol. 8, pp 364-382, 2004.
- [3] Huntley H.E., *The divine proportion. A study in mathematical beauty*, Dover Publications, New York, 1970.
- [4] Cela-Conde C.J., Marty G., Maestù F., Ortiz T., Munar E. et al., "Activation of the prefrontal cortex in the human visual aesthetic perception", *Psychology*, vol. 101, pp 6321-6325, 2004.
- [5] Magherini G., (in Italian) *La sindrome di Stendhal (The Stendhal Syndrome)*, Ponte alle Grazie, Florence, Italy, 1989.
- [6] Gombrich E.H., *Tributes. Interpreters of our cultural tradition*, Phaidon Press, Oxford, 1984.
- [7] Jung C.G., "The Archetypes and The Collective Unconscious" (1934-1954), *The Collected Works of C.G. Jung*, vol. 9 (part 1), Princeton University Press, Princeton, N.J., 1969.
- [8] Valentine C.W., *The experimental psychology of beauty*, Methuen, London, 1962.
- [9] Dutton D., *The Art Instinct: Beauty Pleasure and Human Evolution*, Bloomsbury, New York, 2009.
- [10] Reber R., Schwarz N. & Winkielman P., "Processing Fluency and Aesthetic Pleasure: Is Beauty in the Perceiver's Processing Experience", *Personality and Social Psychology Review*, vol. 8, pp 364-382, 2004.
- [11] Kawabata H. & Zeki S., "Neural Correlates of Beauty", *Journal of Neurophysiology*, vol. 91, pp 1699-1705, 2004.
- [12] Jacobsen T., Schubots R.I., Hofel L. & Cramon D.V. v., "Brain Correlates of aesthetic judgment of beauty", *NeuroImage*, vol. 29, pp 276-285, 2006.
- [13] Berlyne D.E., *Aesthetics and Psychobiology*, Appleton-Century-Crofts, Norwalk, CT, 1971.
- [14] Vartanian O. & Goel V., "Neuroanatomical correlates of aesthetic preference for painting", *Neuroreport*, vol. 15, pp 893-897, 2004.
- [15] Berlyne D.E., *Studies in the New Experimental Aesthetics: Steps Toward an Objective Psychology of Aesthetic Appreciation*, Hemisphere, Oxford, 1974.