

The Possibility of Beauty in Logic

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Abstract:

With the development of modern logic and aesthetics, whether logic contains beauty has become an important topic. Some scholars affirm this and supplement it with two main viewpoints: the formal beauty argument of the logical process and the content beauty argument of the logical result. The author takes these two viewpoints as the object of criticism, based on the clarification of the essence of beauty and the essence of logic, and then discusses the possibility of the beauty of the logical process. The study adopts the method of thinking argumentation, and finally shows that the formal beauty argument of the logical process is wrong in that the formal beauty is not the essential beauty of logic, and the content beauty argument of the logical result is wrong in that the content is not the beauty but only the goodness; the real beauty lies in that the natural consciousness of the mind actively interacts with logic, giving logic the differential variables of form and content, to experience the beauty of immediacy.

Keywords: Logic; Beauty; Process Aesthetics; Mind.

1. Introduction

The founder of the discipline of aesthetics is generally considered to be the German philosopher Baumgarten. In his book *Aesthetics*, Baumgarten divided aesthetics and logic into two independent fields and human cognition into two levels[1]. Aesthetics deals with the vague cognition of sensibility, while logic deals with the clear cognition of reason. This seems to mean that logic and sensibility, aesthetics and reason are incompatible, which means that logic does not contain the elements of beauty.

However, this is not always the case. Many scholars have proposed the relationship between rational cognitive disciplines and beauty. From the perspective of the history of philosophy, Plato regarded beauty as the highest form of reason rather than a mere sensory experience[2]. Kant, on the other hand, argued that

while science, especially mathematics and physics, may lack the kind of beauty found in art, there is still beauty to be found in logic. For Kant, beauty in logic lies in the sense of order and harmony that emerges when the final result aligns with the reasoning process[3]. Hegel added that logical reasoning itself has ontological significance, where the coherence of its process gives rise to a sense of harmony, which he saw as a form of logical beauty[4]. Russell emphasized that features like simplicity, symmetry, and rigor within formal logic systems also carry aesthetic value[5]. In modern philosophical research, Detlefsen believes that logical proofs induce beauty through formal symmetry, simplicity and consistency[6]; Breitenbach believes that mathematical beauty does not come from the conceptual understanding of mathematical objects, but from our experience of creativity in the process of reasoning[7]. In addition,

countless scholars discuss the relationship between logic and beauty in other interdisciplinary disciplines. To sum up, a certain number of scholars believe that there is beauty in logic; some believe that the beauty in logic lies in the contemplative nature of logic, while other scholars believe that the beauty in logic lies in the experience of the logic process. In any case, the possibility of beauty in logic is worth considering.

The existing research gap is that most scholars have not started from systematic philosophical and aesthetic ideas to focus on the essence of logical beauty but have sporadically grasped a corner of logical phenomena to provide theoretical endorsement; the remaining scholars, although they have a relatively complete philosophical thought system, have mistakenly attributed logical beauty to the investigation of the contemplative results. Therefore, it is necessary to re-clarify the essence of logical beauty with a rigorous thought system.

The research topic of this article is: how can beauty be contained in logic, and what is the essence of this beauty. This article begins by clarifying the essence of beauty and explaining the operating principle of logic; then, it presents the previous scholars' discussion of logical beauty under the contemplative result, and points out its shortcomings; finally, it borrows the idea of process beauty from some scholars, extends it, and applies it to logic. The significance of this article is to provide theoretical progress for logical aesthetics and help humans enhance their experience of its beauty in the process of logical thinking.

2. Elucidation of the Nature of Beauty and Logic

2.1 The Nature of Beauty

There is a debate between essentialism and anti-essentialism in the philosophical discussion of beauty. The essentialist path is to find the necessary and sufficient conditions for beauty to give an independent definition, while the anti-essentialist path believes that beauty cannot be defined, either because the beauty of the past is a group of "Family Resemblance", or because the beauty of the future will continue to break through the original norms and update and iterate, or because beauty is subordinate to the real society and the ultimate truth, and is one of them, without its independent status. This article temporarily stands on the position of essentialism to explore the essence of beauty. This is not because the author absolutely advocates essentialism, but because only by perhaps reluctantly limiting beauty to an essential definition can it be convenient to discuss the possibility of beauty in logic. First of all, it must be made clear that beauty is a relation-

ship rather than an attribute. In the field of philosophy history, there has always been a debate on whether beauty is objective or subjective. For example, Aristotle believed that beauty exists in the harmony, symmetry and proportion of things, especially in natural objects and works of art, and these characteristics are objective[8]; Hume believed that beauty lies in the perception of the viewer and cannot rely on objective standards[9]. Regardless of which position they take, beauty is regarded as an attribute of an entity. Santayana inherited Kant's aesthetic ideas and believed that beauty depends on both the objective characteristics of the object and the emotions and experience of the viewer, and is a combination of the subjective and the objective[10]. This article supports the position that regards beauty as a relational reality rather than an attribute reality, and believes that beauty is a relationship between the mind and the object.

This relationship should first be distinguished from the relationship of goodness. In a broad sense, goodness is universal goodness, and goodness is what suits the purpose of the mind. The mind judges the good or bad of an object based on the purpose it sets, recognizes, or maintains. The goodness itself is reflected in the positive traction on the practical choices of the mind. The relationship of beauty is divided into beauty and non-beauty. Beauty is a positive traction on the mind, so beauty belongs to goodness. But not all relationships of goodness are relationships of beauty. The attraction of beauty is a total attraction based on the intuitive attraction of the mind. For example, the attraction of perfume to a person's sense of smell is based on his intuition, no matter what image he can associate with the fragrance, and the relationship between money and people is also goodness, but money itself does not contain the intuition of goodness. It only serves as an exchange symbol to indirectly establish a relationship of goodness.

The positive attributes of this relationship have been determined, but what exactly this relationship is still needs to be analyzed at both ends of the construction of this relationship.

The structure of the mind can be divided in this way. Based on the basic assumption of mind-body dualism, the mind is the spiritual entity of human beings, and the material entity other than the mind is called the environment. The difference between the physical body and non-physical matter lies only in the degree of interaction between the mind and the environment. The structure of the mind itself is divided into three parts based on the two standards of whether it can be conscious or not and whether it can be free or not (among which those who cannot be conscious must not be free), non-consciousness - those who cannot be conscious and cannot be free, natu-

ral consciousness - those who can be conscious but cannot be free, and self-cause consciousness - those who can be conscious and can be free. As the origin of the mind, self-cause consciousness is the spiritual ability endowed by human free will, which can break through the closed chain of other-cause determination and add self-cause changes. Although natural consciousness can be conscious of itself, it cannot change at all and can only act according to the heterogeneous structure of the mind and the environment. The non-consciousness, as an alien existence that cannot be conscious, occupies part of the mind from beginning to end. The essence of being conscious or not is whether it is in the operation of the stream of consciousness. Consciousness becomes consciousness due to the operation of thinking and can be self-aware. Once it becomes static, the connection that establishes itself as the object of awareness becomes rigid and disappears. Self-cause consciousness and natural consciousness are opposite but unified, the same is true for consciousness and non-consciousness, and the same is true for the mind and body. According to the perspective of generativity, the mind is a process that starts from non-consciousness and gradually moves toward natural consciousness and then toward self-cause consciousness.

The general operation mode of the mind is to accept input and practice output. The mind receives signals from the environment and itself, and after being processed by the current function model, it outputs signals to the environment and itself. The function model is what it is, and the special thing is that the function is a function that tends to change at every moment, that is, it is a changer and a changed, that is, the unity of the two; the source of its change is the other-cause environment and the self-cause consciousness. However, the mind is not entirely a changer. As an existence from beginning to end, the non-conscious can only be discovered or suppressed but cannot be changed.

Therefore, there are two ways for the mind to act on the object of beauty, divided into intuition and thinking. Intuitive beauty refers to the direct manifestation of beauty through the projection of the object to the non-conscious. In contrast, the beauty of thinking refers to the positive output of beauty to the mind itself after the input of the object and the non-conscious to the consciousness.

The effect of the object side on the relationship between beauty is usually divided into two parts: form and content. Formal beauty refers to the beauty contained in the objective object itself, that is, the beauty that the mind connects to as the passive party; content beauty refers to the additional beauty that the mind subjectively gives to the object, that is, the beauty that the mind connects to as the active party.

Combining the beauty of different natures at both ends, there are three types of beauty, which are intuitive formal beauty, thinking formal beauty, and thinking content beauty (among which the content cannot be generated without thinking). For a completed art object, such as Bach's Goldberg Variations, the first-level relationship of beauty established from it - such as the joy that comes with the music without thinking - is the intuitive formal beauty, and using the mind's music analysis model analyzes the musical form, texture, etc. of itself to achieve a more delicate and complex understanding of its form, which is the formal beauty of thinking, and through thinking, it is appended with "I seem to have seen some people at the dance." "Dancing" or "I think of the sadness of life at the same time", etc., are the beauty of the content of thinking.

2.2 The Nature of Logic

From the perspective of the history of philosophy, there are mainly the following views on the definition of logic: Frege believes that logic, as a symbolic formal language, is used to express the content of thought; logic is independent of natural language, and the former's unique precise properties can reveal the structure of thought and the truth of the world[11]. Wittgenstein believes that the world is composed of facts, not things; logic captures these facts through a symbol system, so the structure of logic and the world are isomorphic; logical propositions are not descriptions of things, but displays of the relationship between facts. The essence of logic is that it reveals all the possibilities of possible states of the world and sets boundaries for thinking[12]. Pierce believes that logic is not just a formal rule of inductive and deductive reasoning, but also an actual activity of human thinking[13]. In general, logic, as a universal and necessary formal symbol system, can refer to facts for operation in order to achieve a convergence to the holistic truth of the world.

Mind and logic have a close relationship. The operating principle of natural consciousness in the mind is logic; it is a program that accepts input from the environment and the non-conscious part of the mind and operates according to the law of analysis. Unlike natural consciousness, self-consciousness breaks through the law of analysis and possesses the ability to synthesize.

According to its integrated definition, the logical process will omit the content of all symbolic references and will only retain the symbolic form and logical truth value for operation.

3. The Contemplation Aesthetics of Logic

When the process of logic solidifies into a result form, the

possibility of its relationship of beauty with the mind lies in only two places: one is the formal beauty of the logical process, and the other is the content beauty of the logical purpose result. This is because the logical process abstracts away the specific content of things, and the result of anything is only content without involving form. Next, this article will re-examine the arguments of the above two.

3.1 The Formal Beauty Argument of Logic Process and Its Fallacy

As a principle of the reasoning process, logic has the following formal characteristics when applied to a specific reasoning process: in horizontal structure, logic may have the characteristics of symmetry; in vertical structure, logic must have the characteristics of coherence and hierarchy. Symmetry means that in a level of logic, its formula also contains the expression of its symmetry. Examples include commutative law, duality principle, bijective relationship, etc.

Coherence means the smooth connection and internal consistency between the parts of a logical argument. The logical structure is a clue that connects the propositions and conclusions, making the whole reasoning process natural, reasonable and easy to follow.

Hierarchy means the orderly arrangement and progressive relationship of the parts in a logical structure. For example, the major premise and minor premise in propositional logic are premises under different quantitative categories, with different levels.

Therefore, there is the following argument:

① Objects with symmetry, coherence and hierarchy can establish a relationship of beauty with the non-consciousness of the mind.

② Logic has symmetry, coherence and hierarchy.

③ From ①②, it can be obtained that beauty is contained in logic.

The premise and reasoning form of this argument seem impeccable. However, the question that needs to be re-examined is whether the formal beauty contained in logic is the beauty contained in the essence of logic. Take an example to illustrate this. The patterns on coins may be symmetrical, and may be able to establish a relationship of beauty with the mind, but could it be thought that the positive relationship between the essence of coins and the mind is derived from this? Obviously not; poetry establishes a relationship of beauty because of the connotation of its words, and it cannot be attributed to the beauty contained in the essence of poetry because of the beautiful appearance of its words. Therefore, for logic, its symmetry is not like that of a picture, its coherence is not like that of music, and its hierarchy is not like that of architecture.

Therefore, these three are not the beauty contained in the essence of logic, and can all be replaced by better ones.

3.2 The Content Beauty Argument of Logic Result and Its Fallacy

After excluding the formal beauty of the logical process, there is still a group of scholars who argue that logic contains content beauty on the basis of considering the logical process as a complete purpose result. Their arguments are as follows:

① Logic is a process of transforming the knowledge of an object from unknown to known and from part to whole.

② The natural consciousness of the mind has the purpose of „living for oneself“.

③ The purpose of „living for oneself“ implies the purpose of cognition of others.

④ According to ②③, the natural consciousness of the mind has the purpose of knowing others.

⑤ According to the definition of goodness, an object that conforms to the purpose of the mind can establish a good relationship with the mind.

⑥ The transformation process from unknown to known and from part to whole conforms to the cognitive purpose of the mind for others.

⑦ According to ①④⑤⑥, logic is a good process.

⑧ A process of goodness that does not deviate from form belongs to beauty.

⑨ Logic cannot be separated from its form.

⑩ According to ⑦⑧⑨, the result of the logical process contains beauty.

⑪ According to the definitions of formal beauty and content beauty, formal beauty refers to the beauty contained in the objective object itself, that is, the beauty connected by the mind as the passive party; content beauty refers to the additional beauty that the mind subjectively gives to the object, that is, the beauty connected by the mind as the active party.

⑫ According to 3.1 ⑪, the beauty contained in the logical result is not formal beauty

⑬ According to ⑩⑪⑫, the beauty contained in logic as a result is content beauty.

The premise and reasoning form of this argument also seem to be impeccable. However, the problem that needs to be re-examined is that there seems to be a mistake of replacing concepts in the seventh, eighth, ninth and tenth points. The so-called „the process of goodness that does not separate from form belongs to beauty“ in the eighth point should contain „the beauty caused by the form itself“, rather than the situation of cause and effect separation - a whole has form and content, and the goodness caused by the content alone becomes the beauty of the whole. Take an example to illustrate this. Appreciating

a delicious meal belongs to beauty while eating an unpalatable nutritious meal belongs to goodness because it contains healthy content that meets human purposes, but it should not belong to beauty. The goodness it contains is not caused by the fact that it may produce a form of beauty. Therefore, the result of the logical process does not contain content of beauty.

4. The Process Aesthetics of Logic

4.1 The Basis for The Shift to Process Aesthetics

In the 20th century, some scholars proposed a process turn in aesthetics outside the scope of traditional contemplative aesthetics. Among them, the two most important ones are Whitehead and Dewey.

Whitehead believes that the world is not composed of fixed materials, but of „actual events“. These entities are not independent and unchanging, but constantly changing and developing. They define themselves through their relationships with other entities. Therefore, the essence of existence is process and relationship. Furthermore, beauty is a continuous creative process. It is not the product of a specific moment, but is displayed through the continuation of time and the accumulation of events. Every experience of beauty is gradually formed and realized in this creative process, which not only contains the accumulation of the past, but also opens to the possibilities of the future. In short, Whitehead's aesthetic thought realizes the leap of the relationship of beauty from static objects to dynamic processes, from independent individuals to relational networks, and from passive viewing to active participation[14].

Dewey emphasized that aesthetic experience is a „complete experience“, that is, a unified and coherent experience, which gradually unfolds from a clear beginning and finally reaches an emotional and cognitive climax and end. This experience is highly ordered, including both rational thinking and emotional participation. It is different from the trivial and mechanical experience of daily life, but a state of full involvement. Dewey's aesthetic thought has achieved a leap from static object to dynamic experience, from form to experience, and from elite art to universal art[15].

In view of the two, it is necessary to analyze the essence of process beauty as different from static beauty. Process beauty has the following characteristics: First, from the perspective of the object of beauty, the object of beauty is no longer a fixed and unchanging individual, but as a generated individual, it mainly interacts with the consciousness of the mind, that is, the object of beauty has a tendency to change beauty at every moment in the rela-

tionship, and the formal differential variable and the content differential variable will replace the two themselves to play a role in process beauty; second, from the perspective of the temporality of the relationship of beauty, the relationship of beauty is mainly established in the present of the interaction process, and then it will become a static relationship. Take an example to illustrate this. Beethoven's creative process is an aesthetic process of the beauty of process. His musical ideas and the score are constantly communicated and modified until the final product is reached. Before reaching the final product, the beauty he experiences is the beauty of the process.

4.2 The Possibility of Beauty in Logical Process

Based on the above foundation, the possibility of logical process beauty is demonstrated as follows:

- ①The logical process is the process of thinking from unknown to known, from part to whole in relation to a problem.
- ②The cognitive result from unknown to known, from part to whole has actual increments in the form of cognition and the content it refers to.
- ③The process in which the form or content of the object directly caused by the mind has actual increments belongs to the relationship of process beauty established with the mind.
- ④Based on ①②③, the logical process has process beauty.

The entire argumentation process also needs to be re-examined. On the one hand, the core of the logical process is the progress of cognition, so the beauty of the process is also the core of the logical beauty; on the other hand, the beauty of the process is not just goodness but not beauty, because the mind directly feels the beauty in the logical process, rather than achieving this goal through indirect reference, which is achieved through the resonance of natural consciousness and logical development.

Perhaps some scholars will question this: other processes, such as agricultural labor, also contain process beauty, so it can be concluded that the beauty of the process is not the essential beauty contained in logic. However, the actual difference between the two is that logic is a direct process of consciousness operation, while the process of practice is the indirect and objectified process of consciousness. It can be seen that the process beauty of logic has the characteristics of purity and directness, which surpasses the process beauty of other objects.

5. Conclusion

This study proves that there is the possibility of beauty in logic, and the core of this beauty lies in process beauty.

First, through the experience of the mind of the logical process, the mind intuitively believes that there is beauty in logic. Secondly, according to the previous scholars' insufficient views on the beauty of logic, this paper criticizes and supplements it. Finally, this paper proposes the possibility of process beauty in logic and the essence of process beauty.

This study fills the gap in the classification of beauty in aesthetics and the gap in the relationship between logic and beauty. This study is conducive to logicians and aestheticians to further study the beauty of logic, and at the same time, it is conducive to using logic as an analogous aesthetic material to explore other areas of beauty that may exist but have not yet been proven. The essence of process beauty is an emerging philosophical field that needs to be explored urgently, and this study provides a starting point for the exploration of this field.

At the same time, due to the limited space of this study, there are still the following deficiencies: the essence of the process beauty of logic is not analyzed in detail, but only its existence is proved; it does not combine many logical examples to explain the process of the process beauty of logic. This needs to be further studied by scholars in the future, focusing on analyzing different famous logical examples, and implementing the improvement of the mechanism of the action of logical process beauty.

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