Chapter 8
Aesthetic Value

In this chapter I develop an extensional notion of aesthetic value. To this end, I shall use McAllister's findings, my revision of them, and some of Goldman's ideas.

Let us remember that Goldman conceives aesthetic value as a relation between objective properties in an object and subjective responses in an observer. More specifically, he interprets *evaluative* aesthetic properties as constituted by relations between non-evaluative properties and reactions in observers [29, p. 45]. One reason why Goldman's approach to aesthetic value is attractive to this project is that his proposal captures a tenet that aesthetic theories have assumed ever since it was introduced by Kant: that evaluations of objects in aesthetic terms are grounded on *subjective* matters. A second reason why Goldman's view is attractive is that it is consistent with the idea endorsed here that affective responses are involved in aesthetic experiences. Affective responses offer a way of connecting the subjectivity involved in aesthetic experience with the one in aesthetic value. Thus, I shall further use affective responses to elaborate the concept of aesthetic value.

Now, affective responses, as we have discussed in the previous chapters, can be interpreted as non-cognitive evaluations of stimuli. However, in order to more accurately characterize the role of affective evaluations in propositional evaluations such as "Euler's identity is the most beautiful theorem in mathematics" we need to address affective responses in a different way. Fortunately, James McAllister's conception of aesthetic criteria provides us with an effective way of dealing with evaluations in a concrete cognitive manner. An aesthetic criterion expresses a person's or community's preference for a property P in the form of a propositional rule. For example "if a theory has P, attach more aesthetic value to it than, if other circumstances are equal, it did not". Since a person's preferences are often actualized as affective responses towards objects or stimuli, an aesthetic criterion can be seen as expressing the objective—in the sense of independent of the subject—conditions for eliciting responses. The advantage of aesthetic criteria is that they are explicit and they are not necessarily limited to a specific person; they can also be used to express the tendencies of a community. Aesthetic criteria characterize a normative link between preferences, objects and values. In other

U. Montano, *Explaining Beauty in Mathematics: An Aesthetic Theory of Mathematics*, Synthese Library 370, DOI 10.1007/978-3-319-03452-2_8,

words, aesthetic criteria express normative relations between objective states of affairs and subjective responses. Since evaluative aesthetic properties are conceived as relations between objects and responses, aesthetic criteria as characterized above, are instances of evaluative aesthetic properties. For the sake of brevity, I label them *evaluative-instances*. Now, the extension of the concept of aesthetic value comprises the collection of all things it applies to; that is, the exhaustive collection of all possible evaluative-instances. Thus, the extension of the concept of value can be expressed as a set of aesthetic criteria. Conceiving aesthetic value in this extensional way allows us to use set theoretical tools and techniques to gain insight into aesthetic value, which shall be useful below.

Now, to fully characterize aesthetic value in the context of an aesthetic-process, we need to determine two things: the content of the concept and, perhaps more importantly, the role it plays in an aesthetic-process. Here, we shall deal with the *content of the concept* in an extensional manner. The *role* of value in an aesthetic-process shall be interpreted as *to provide the norms that are actualized in evaluations*. There are two ways in which an aesthetic value can be actualized: as a non-cognitive affective evaluation, or as a propositional evaluation expressed in an aesthetic judgement. Aesthetic preferences embody the affective side of a value, whereas propositional aesthetic criteria embody the cognitive side. In this sense, preferences, aesthetic criteria and evaluative-instances covary; that is, they can only change together.

We have seen that an approach focused merely on aesthetic properties is insufficient to account for instances of beauty like the beauty of mathematical proofs. In our analysis of aesthetic experience, we addressed the necessity of incorporating mental activities and mentally constructed objects as sources of affective responses, in addition to properties. Those considerations must be taken into account in developing our notion of aesthetic value. A way to do that is to generalize Goldman's ideas. For Goldman, evaluative properties are relations between properties of objects and reactions in the observer. I shall embrace a generalization of this idea which includes properties, mental activities and *sets* of properties and mental activities, including sets with both properties and activities (property/activity sets, for short), and their associated affective reactions to define the extension of the concept of aesthetic value as follows:

8.1 Extension of Aesthetic Value

The extension of aesthetic value comprises all relations between properties, mental activities and sets of properties and mental activities associated with an object; and their resultant positive or negative reactions in the observer.

Including sets of properties and activities in our conception of aesthetic value allows us to establish a connection between aesthetic values and the intentional objects in the phenomenological space of our aesthetic experience in appreciating objects. Of course, the introduction of property/activity sets involves some

complications. For example, for any set S associated with an affective response, we can ask about the aesthetic value of its subsets, supersets and partially overlapping sets. The approach formulated above involves an exhaustive collection of evaluative-instances; that collection should include the subsets, supersets and overlapping sets as elements only if they themselves have an associated affective response.[1] That is also one of the reasons why in order to avoid paradoxes or other inconsistencies the collection of value-instances is construed as a set in the technical set-theoretical sense. I label the set of all possible evaluative-instances the *Value Set*. It must also be noted that my characterization of aesthetic value is restricted to sets of properties associated with actual affective responses. My approach is thus descriptive rather than normative regarding which objects or qualities possess aesthetic value.

This description of aesthetic value, along with the role it plays in a typical aesthetic-process, can be summarized by interpreting aesthetic value as a *repository of all actual norms of evaluation involved in an aesthetic-process*. More formally, aesthetic value is the set of ordered pairs $\langle S, r\rangle$, where S is a set of properties and mental activities associated with an object, and r its associated response. S is not a single property but a set itself. More specifically, S is an element of the power set of the set T of all descriptive properties and mental activities of objects. That is:

$$S \in \wp(T)$$

where: S is a property/activity set; and T is the set of all descriptive properties of objects and all mental activities associated with contemplating those same objects.

As for the second component of the ordered pair we have:

$$r \in ENJOYMENT$$

where:

$$ENJOYMENT = \{y | \exists \langle x, y\rangle \in BasicPleasure \cup PerformativePleasure \cup AdaptivePleasure\}$$

The value-set can be simply expressed as:

$$V = \{\langle S, r\rangle\}$$

The values we held to are different for different types of aesthetic experience: in the appreciation of painting, for example, the properties and mental activities involved are different from the ones involved in the appreciation of music. We can envisage different value repositories for different aesthetic-processes depending on

[1] This approach is consistent with the view that no set of non-aesthetic properties determines an aesthetic property [82].

the type of aesthetic experience involved. In the case of mathematics the properties, mental activities and responses involved in aesthetic value are the same as those involved in mathematical aesthetic experiences. Those properties, activities and responses determine the content of the value repository for aesthetic-processes in mathematics. For example, the property of simplicity has appeared in our experience of the derivation of De Moivre's theorem. Our notion of value tells us that our repository should include the ordered pairs that associate the positive reaction to this derivation with the set $\{simplicity\}$, as follows:

$$\langle \{simplicity\}, \langle P, N \rangle \rangle \in V_M$$

where V_M is the value repository for *mathematical* aesthetic value.

The fact that a value repository like V_M depends on the type of aesthetic experience tells us that there are different types of value. We can think of the general notion of aesthetic value as comprising different types of value, corresponding to different types of experience.

The division of value into different types of repositories can be understood as modelling different types of aesthetic value; musical value, mathematical aesthetic value, negative aesthetic value, etc. The application of predicates to the concept of value can thus be interpreted as taking a subset from the general value set. That subset is the repository governing aesthetic experiences qualified by the same predicate: musical experience has an associated musical value repository, negative aesthetic experience has a negative value repository, and so forth.

We can also interpret the individual elements of a value repository—its evaluative-instances—as the particular preferences that are actualized in an individual aesthetic-process. For example, in the case of Euler's identity, simplicity plays a role in eliciting a positive response. This means that the value repository at work in mathematical appreciation (the mathematical positive value repository) includes $\langle \{simplicity\}, \langle P, N \rangle \rangle$.[2] This pair models the particular preference actualized in our affective response, and in the public description of Euler's identity as beautiful.

Among the different types of value repositories there is a very salient distinction between positive and negative value. There are negative as well as positive aesthetic evaluations. There is bad music, bad painting, as well as ugly pieces of mathematics—let us remember that most theories on mathematical beauty are somehow unsatisfactory when it comes to addressing mathematical ugliness. We can envisage two value repositories characterized by their positive or negative associated responses. Positive and negative value repositories are particularly important when considering the dynamical aspect of preferences and values. Positive and negative preferences played the central role in revising McAllister's aesthetic induction.

[2]In addition to this individual value, our value repository includes pairs associated with the simplicity of different kinds of experience, for example simplicity in the derivation of De Moivre's theorem's; $\langle \{simplicity, parsimony\}, \langle P, N \rangle \rangle$.

The evolution pattern of positive constant preferences might be consistent with McAllister's model, but negative ones are not. An examination of the dynamics of these two repositories is thus in order.

We have discussed how a person's or a community's history of experiences affect to different degrees the evolution of their preferences. Whereas McAllister's model of the aesthetic induction seems to capture some important patterns of evolution documented historically, it also exhibits significant anomalies. The model advanced in Chap. 5 addressed those anomalies. The preferences of a person or a community are most of the time not explicitly available, but rather only implicitly held. Now, aesthetic criteria can be interpreted as explicit, hence public in principle, expressions of preferences. We can thus utilize explicit aesthetic criteria to monitor, to track, implicit preferences. Utilizing explicit aesthetic criteria has the further advantage that the evolution of preferences can be modelled by attaching to each individual criterion a weighting proportional to the degree of intensity of the preference it tracks. In this regard, the discussion encompassing Chaps. 2, 4 and 5 shall now pay off again. In Chap. 5 we saw that by interpreting sets of aesthetic criteria as systems, the different models of evolution differed only in the evolution rule that determines the dynamics of the system. Moreover, that evolution rule was expressed in terms of the parameters attached to a property P; its weighting, critical adequacy and robustness. None of those parameters depend on whether P is a single property or a more complex set of properties or other items. The Naturalized Evolution Rule proposed in Chap. 5 is committed only to a description of the change in the weightings and not to a particular explanation of it; for that very reason, it is neither committed to a particular kind of objects to which the parameters are attached. The introduction of property/activity sets as the entities to which we attach the parameters of weighting, critical adequacy and robustness does not affect the evolution rule itself. Thus, we can use a variation of the Naturalistic Evolution Rule to model the evolution of aesthetic value, just as we used it to model the evolution of the aesthetic canon. To accomplish this we need to introduce the appropriate concepts. First, aesthetic criteria.

8.2 Typical Positive Aesthetic Criterion

If there exists a set S of descriptive properties and mental activities associated with contemplating an object O and those properties and activities are conjunctively responsible for eliciting an affective response, then more aesthetic value is associated with O.

For example, the property of simplicity plays a central role in the aesthetic experience of the derivation of De Moivre's Theorem or Euler's identity. In these cases our property/activity set is {*simplicity*}. The aesthetic criterion at work in our evaluations is:

If the simplicity of a theorem results in an affective response, then more aesthetic value is associated with {*simplicity*}

Our preferences for simplicity are actualized in the derivation of De Moivre's Theorem and in Euler's identity by the eliciting of a positive affective response. The criterion states that such actualization of the preference implies that the derivation and the identity possess aesthetic value.

The above definition of aesthetic criterion generalizes McAllister's conception by taking into account mental activities and constructions. It takes into account not only single properties, but also the mental activities involved in appreciating things like mathematical proofs and derivations—and narratives and music, for that matter. This allows us to account for a wider class of preferences involved in aesthetic experiences. In my approach to aesthetic experience, affective responses are elicited due to the presence of aesthetically relevant properties or the performing of certain mental activities. These properties and activities are the same as those that constitute the property/activity sets S involved in the evaluative-instances $\langle S, r \rangle$. Although neither inner experiences nor personal values are publicly available, we can easily infer the existence of certain aesthetic criteria from the available historical and behavioural evidence. The public reaction of a person to his engaging in contemplating an object is evidence that the person has made an evaluation based on his values. Thus, if a public aesthetic judgement on an object is passed by a person, we can assume that person has made the evaluation based on his values. Even if the process of evaluation and the values involved are not accessible, the resulting judgement *is accessible* to us. Once an aesthetic judgement is available, we have enough information to infer the existence of an aesthetic criterion, and thus to track its associated aesthetic value. This fact has been exploited by McAllister, Kuipers and myself to model the dynamics of preferences and we can thus use it now to model the dynamics of value.

8.3 Dynamics

In order to deal with the dynamics of value we need to model the intensity with which a set of properties and mental activities is able to actualize affective and behavioural tendencies—to utter a public judgement, for example. Thus, our model must incorporate a weighting expressing the intensity of the strength of the preference tracked by an aesthetic criterion. We must simply introduce a weighting W gauging the strength of the relation of S to r. This, of course, is the same idea as the one in our model of preference evolution and shall allow us to recourse to that model to examine the dynamics of aesthetic value.

8.3.1 Value and Aesthetic Canon

Attaching a weighting to each evaluative-instance shall help us to model the changes in preference intensity. But in addition to changes in intensity, the value set

undergoes a second type of change: its extension may change. Which evaluative-instances are in the value set—or in a specific repository, for that matter—changes depending on whether or not they are able to elicit an affective response. Some evaluative-instances that were formerly elements of the value set can eventually stop being elements, whereas new instances can become elements. For example, Le Lionnais' view on Euler's identity is it that what was once regarded as the most beautiful formula in mathematics, but ended up being unremarkable or even insipid [58, p. 128]. Thus, in Le Lionnais's view, the intensity of the preference associated with the identity changed from a high degree of intensity to a very low or even nil degree. If Euler's identity is really unremarkable and fails to elicit any response, then its associated evaluative-instance cannot be in the value-set. In this case, the extension of aesthetic value has changed, since a former element is now missing.

In this sense, there is an important difference between an aesthetic canon and a value-set. An aesthetic canon comprises all properties of theories regardless of their associated responses. The value-set is a subset of an aesthetic canon, since it comprises only elements with an evaluative component; that is, with an associated affective response. This means that the evolution of aesthetic value amounts to the evolution of a subset of an aesthetic canon. In this sense, to model the dynamics of value, we can model the evolution of an aesthetic canon and then simply focus on the value subset in which we are interested. Now, the notion of aesthetic canon as proposed by McAllister and even the revision proposed in Chap. 5 is not compatible with our conception of value, since they comprise only properties of objects. But a notion of aesthetic canon adequate for our purposes can be trivially defined as a follows:

Generalized Aesthetic Canon A person is moved to experience an affective response or pass an aesthetic judgement on an object as a consequence of his holding to one or more aesthetic criteria (as define above) which attach aesthetic value to the object.

In principle, there might be as many aesthetic criteria as sets of properties and mental activities, including the ones which do not elicit an actual response. As in Chap. 5, we shall interpret the collection of all those criteria in a set theoretical manner to take advantage of systems theoretical tools. Thus, the set of all possible aesthetic criteria to which a person or community might hold to constitutes his or its generalized aesthetic canon. To each aesthetic criterion there is attached a weighting W gauging the intensity with which the criterion is held. In this way, the evolution of an aesthetic canon can be modelled simply as changes in the weightings. A fully expressed aesthetic criterion, including its intensity, is represented by three items of information: the set S of properties and mental activities, its associated response r, and its associated weighting W_S.

An aesthetic canon is thus the set:

$$C = \{\langle S, r_S, W_S\rangle | S \in \wp(T)\}$$

where:

S: a set of properties and mental activities.
T: the set of *all possible* properties and mental activities.
$\wp(T)$: is the power set of T.

It must be noted that the responses can be a mixture of positive, negative, and *indifferent* (no response whatsoever) and have a passive (by mere observation of properties) or active (by performing activities) source; and the weightings can have a *zero* value.

Ideally, an aesthetic canon comprises an infinite number of elements: one for each set of properties and activities to which aesthetic value could conceivably be attributed. In the case of any given person, the majority of those elements shall carry a weighting of zero, since we typically attach an aesthetic value to only a few properties or mental activities and are indifferent to the rest.

Now, the evolution of an aesthetic canon amounts simply to changes in the weightings W. Changes in preferences must be modelled in accord with historical evidence and empirical findings, as discussed in Chap. 5. Since none of the modifications introduced here concern the mechanism that modifies preferences we can resort to the model advanced there. The evolution of our generalized aesthetic canon is thus governed by a variation of the mechanism I labelled constrained aesthetic induction.

8.4 Aesthetic Canon Evolution

To address the dynamic character of the aesthetic canon, we can envisage that its compilation is carried out as follows:

A community compiles its aesthetic canon $C = \{\langle S, r, W_S(t)\rangle\}$ *at a certain time* t *by attaching to all sets* S *of properties and mental activities a response* r *and a weighting* $W_S(t)$ *determined by the Naturalized Evolution Rule II, defined below.*

8.4.1 Naturalistic Evolution Rule II (NERII)

$$W_S(t) = (1 - R_S)gA_S + R_S W_S(t-1)$$

Where:

$W_S(t)$ is the weighting associated with S at time t, resulting from the evolution of the canon.

$W_S(t-1)$ is the original weighting at a prior time $t-1$, before the evolution of the aesthetic canon.
A_S is the degree of critical adequacy of S with range $[0, 1]$.
R_S is the degree of robustness of S with range $[0, 1]$.
g is a constant that gauges the ratio between the weightings and the degrees of critical adequacy. It expresses the global rate of change in a given aesthetic canon in absence of robustness.

As before, if the robustness is low, the function models classic aesthetic induction; if it is high the function models the tendencies of historical constants. Of course, we need to define critical adequacy and robustness. Critical adequacy is defined as follows:

Critical Adequacy

An object O is critically adequate (or inadequate) if and only if there is a set S of properties of O and mental activities associated with contemplating O that guarantees that an average person with the appropriate experience will pass a positive (or negative) aesthetic judgement on O.

This notion of critical adequacy captures the fact that pleasing properties or activities motivates the eliciting of aesthetic evaluations. But as before, a notion that admits degrees is better suited to be interpreted as a parameter in our evolution rule. Consider thus the following definition:

Degree of Critical Adequacy

An object O has a high degree of critical adequacy (or inadequacy) if and only if there is a set S of properties of O and mental activities associated with contemplating O whose presence makes very probable that an average person with the appropriate experience will pass a positive (or negative) aesthetic judgement on O.

As we know, robustness of critical adequacy is necessary for an anomaly-free model.

Robustness of Critical Adequacy

The critical adequacy of a set S of properties of O and mental activities associated with contemplating O is robust if and only if the properties and activities in S are able to motivate the same affective response despite changes in the history of experiences with those properties and activities.

To incorporate robustness as a parameter into an evolution rule consider:

Degree of Robustness of Critical Adequacy

The critical adequacy of a set S of properties of O and mental activities associated with contemplating O is robust in a high degree if and only if in most cases the properties and activities S are able to motivate the same affective response despite changes in the history of experiences with those properties and activities.

Robustness helps us to model the tendencies of properties like simplicity or complexity to maintain their degree of critical adequacy, despite the fact that a history of experiences with such properties builds up over time.

As mentioned above, the repositories for positive and negative value play a very relevant role in an accurate depiction of the evolution of preferences. As we know from our discussion of aesthetic experience, the affective response elicited by contemplating properties is independent from the response elicited by performing mental activities and thus the experience can involve a mixture of positive and negative responses. To address the possibility of mixed responses, I shall use two independent evolution rules to model the evolution of positive and negative components of the response. In this way we shall be able to model, in principle, a much wider and more complex range of evolution patterns.

8.4.2 Positive Value

We only need special versions of the concepts formulated above to independently model the dynamics of positive and negative value repositories. The notions needed to model the dynamics of positive and negative value can be trivially obtained from the general definitions, as follows: let $+$ denote an affective response with at least one positive component; $-$ one with at least one negative component; and $\varnothing$ no response whatsoever. The rage of the variable for affective response in the aesthetic canon r is thus $\{+, -, \varnothing\}$, or $r \in \{+, -, \varnothing\}$. Notice that a $+$ response does not exclude a $-$ response, I have chosen this characteristic in order to allow aesthetic experiences with mixed responses to be involved in two different patterns of evolution, one induced by the positive component and another by the negative one. These patterns of evolution are induced by positive and negative evolution rules; defined as follows:

Partially Positive Aesthetic Criterion

If there exists a set S of descriptive properties and mental activities associated with contemplating an object O and those properties and activities are conjunctively responsible for eliciting any kind of *positive* affective response, then more positive aesthetic value is associated with O.

A typical evaluative instance in the positive value set has the form:

$$\langle S, +, W_S(t)\rangle$$

Positive aesthetic value can be extensionally defined as:

Positive Aesthetic Value

$$V_+ = \{\langle S, +, W_S(t)\rangle | \langle S, +, W_S\rangle \in C\}$$

The evaluative-instances in V_+ are modulated by the Naturalistic Evolution Rule II in which the parameters model the following notions:

Degree of Positive Critical Adequacy

An object O has a high degree of *positive* critical adequacy if and only if there is a set S of properties of O and mental activities associated with contemplating O whose presence makes very probable that an average person with the appropriate experience will pass a *positive* aesthetic judgement on O.

Degree of Robustness of Positive Critical Adequacy

The positive critical adequacy of a set S of properties of O and mental activities associated with contemplating O is robust in a high degree if and only if in most cases the properties and activities S are able to motivate the same positive affective response despite changes in the history of experiences with those properties and activities.

The evolution rule for positive value is:

Positive Value Naturalistic Evolution Rule (PVNER)

$$W_S(t) = (1 - R_S)gA_S + W_S(t-1)R_S$$

where:

$W_S(t)$ is the weighting associated with S at time t, resulting from the evolution of the positive value set.

$W_S(t-1)$ is the original weighting at a prior time $t-1$, before the evolution of the positive value set.

A_S is the degree of positive critical adequacy of S with range $[0, 1]$.
R_S is the degree of robustness of positive critical adequacy S with range $[0, 1]$.
g is a constant that gauges the ratio between the weightings and the degrees of positive critical adequacy.

8.4.3 Negative Value

When we discussed McAllister model of the evolution of aesthetic preferences we found out that the evolution of negative historical constant was very problematic. The model developed in Chap. 5 solved that problem. With some trivial modifications the Naturalistic Evolution Rule II can now model the dynamics of negative values. The definitions are as follows:

Partially Negative Aesthetic Criterion

If there exists a set S of descriptive properties and mental activities associated with contemplating an object O and those properties and activities are conjunctively responsible for eliciting any kind of *negative* affective response, then more *negative* aesthetic value is associated with O.

A typical evaluative instance in the negative value set has the form:

$$\langle S, -, W_S(t)\rangle$$

Negative aesthetic value is extensionally defined as:

Negative Aesthetic Value

$$V_- = \{\langle S, -, W_S(t)\rangle | \langle S, -, W_S\rangle \in C\}$$

The notions for the parameters in the evolution rule are:

Degree of Negative Critical Adequacy

An object O has a high degree of *negative* critical adequacy if and only if there is a set S of properties of O and mental activities associated with contemplating O whose presence makes very probable that an average person with the appropriate experience will pass a *negative* aesthetic judgement on O.

Degree of Robustness of Negative Critical Adequacy

The negative critical adequacy of a set S of properties of O and mental activities associated with contemplating O is robust in a high degree if and only if in most cases the properties and activities S are able to motivate the same negative affective response despite changes in the history of experiences with those properties and activities.

The evolution rule for negative value is:

Negative Value Naturalistic Evolution Rule (NVNER)

$$W'_S(t) = (1 - R'_S)g'A'_S + W'_S(t-1)R'_S$$

where:

$W'_S(t)$ is the weighting associated with S at time t, resulting from the evolution of the negative value set.
$W'_S(t-1)$ is the original weighting at a prior time $t-1$, before the evolution of the negative value set.
A'_S is the degree of negative critical adequacy of S with range $[0, 1]$.
R'_S is the degree of robustness of negative critical adequacy S with range $[0, 1]$.
g' is a constant that gauges the ratio between the weightings and the degrees of negative critical adequacy.

8.4.4 Aesthetic Experience and the Application of Value Repositories

The conditions under which positive or negative notions are applied depend on the type of value repository that is actualized in a given situation. One of the ways in which aesthetic values are actualized is in affective responses. Since affective responses are accessible only in our inner experience, there is an inherent link between aesthetic experience and values. We can exploit this fact as a way to decide which particular repository should be used in a given situation, and thus which model of evolution is appropriate. We can use the different types of aesthetic experience to determine the application of the positive or negative value repositories by following these rules:

1. Positive and Negative Value Naturalistic Evolution Rules govern positive and negative value subsets respectively.
2. If the set S of properties and activities associated with object O is a superset of the set of dimensions of its corresponding intentional object (the object in

our inner experience) and the enjoyment associated with that intentional object consists of pleasing affective responses (including mixed responses in which any response is positive), then S is involved in *positive* aesthetic criteria, value set, critical adequacy and robustness.

3. If the set S of properties and activities associated with object O is a superset of the set of dimensions of its corresponding intentional object and the enjoyment associated with that intentional object consists of displeasure responses (including mixed responses in which any response is negative), then S is involved in *negative* aesthetic criteria, value set, critical adequacy and robustness.

It is trivial now to illustrate the evolution of value modelled above by recalling Le Lionnais' view on Euler's identity. We started with a positive preference for Euler's identity, but as our experiences (or at least Le Lionnais's) influenced that preference, it changed until the preference finally ended up turning into an irrelevant or even a negative one. In this case, an aesthetic criterion *If simplicity and composition are properties of a mathematical item, then more positive aesthetic value is associated with the item*, started with a high weighting, which eventually faded away as the properties lost their capacity to elicit a response. Although the criterion started with a strong influence, it was not robust enough to remain stable. The *negative* naturalized evolution rule kicked in changing its strength until the criterion was no longer aesthetically relevant. Now, if we regard Le Lionnais's judgement as negative rather than neutral—as in, for example, "Euler's formula is insipid" rather than the more polite "Euler's formula is fairly unremarkable"—we can further say that the negative evolution pushed further, and that the now negative criterion *if simplicity and composition are properties of a mathematical item, then more negative aesthetic value is associated with the item* gained strength.

Note that in cases of mixed responses, positive as well as negative evolution rules govern the change in the weightings. This is consistent with the approach to aesthetic experience endorsed here, since we established that there is no clear cut division between positive and negative experiences, but rather a mixture of positive and negative experiences. This is also consistent with the facts that aesthetic terms possess rather fuzzy meanings, that they seem to admit degrees, and that there are no fixed rules that determine their correct application. According to the definitions above, positive and negative value sets overlap each other, when we discuss aesthetic terms it will be clear that this phenomenon is not only consistent with the way aesthetic judgements are made, but it actually can help us to explain some characteristics of aesthetic judgement. In the next chapters, we shall see that positive and negative evaluations are not simply each other's opposites; but rather that their relation is more like that of the members of *families*.