

ART AND SCIENCE: AN OUTLINE OF A POPPERIAN AESTHETICS

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ALTHOUGH SIR Karl Popper is likely to be remembered mainly as a philosopher of science, his contribution to philosophy ranges from logic, philosophy of mathematics, epistemology, metaphysics and philosophy of mind, to social theory, philosophy of history, moral and political philosophy. The distinct unity of Popper's thought enables one to speak of a Popperian *Weltanschauung*, of a comprehensive philosophical system comparable to those of the classical philosophers. There is just one philosophical discipline which has not been systematically explored by Popper, namely aesthetics.

The purpose of this essay is to suggest an outline of a Popperian aesthetics. I shall try to show that the main ideas of Popper's philosophy of science can be adapted to the philosophy of art. In section I, I will suggest that the principle of falsifiability, which plays a central role in Popper's philosophy of science, can be applied to aesthetics. The relation between a hypothesis and 'basic statements' which serve as a base for Popperian testing will be shown (in section II) to have its aesthetic analogue, suggesting that aesthetic value judgements are, in a certain sense, testable. In section III, the asymmetry between the verification and falsification of scientific hypotheses will be shown to be analogous to the asymmetry between the justification of positive and negative aesthetic value judgements. It will also be suggested that good works of art are more 'falsifiable' than bad ones in the sense that the former are easier to spoil and more difficult to improve than the latter. This intuition will be developed (in section IV) into a quantitative model of aesthetic evaluation. Popper's conception of corroboration will be applied to the model in order to show that it may also have practical implications for art criticism. This model (which will be presented in the schematic form of an algebraic formula) should be seen as a rational reconstruction of aesthetic value judgements, which is intended to lay bare their basic logical structure. The three components of the proposed formula will be interpreted as suggestions for explication of the classical concepts of *unity*, *complexity* and *intensity*—concepts that have hitherto been understood only on a purely intuitive level as primitive concepts. The internal structure of these concepts will thereby become transparent.

As a starting point I would like to take up Nelson Goodman's suggestion that aesthetic excellence is better understood in terms of *rightness* rather than in terms of beauty.¹ Following Goodman, I shall speak of good works of art as being

right and bad works of art as being wrong. However, instead of linking aesthetic rightness to 'projectability' or 'entrenchment', as Goodman does,² I propose to analyse aesthetic rightness in terms of 'falsifiability'.

The proposed analogy could be outlined as follows: in Popper's philosophy of science the concept of falsifiability plays basically a twofold role: (1) it serves as a *demarcation criterion between propositions of a scientific and propositions of a non-scientific character*; and, (2) *the degree of falsifiability serves as a measure of epistemic, or scientific worth*. I shall try to show that the concept of aesthetic 'falsifiability' can be construed so as to perform essentially an analogous dual function: (1) to serve as a *demarcation criterion between aesthetic and non-aesthetic character*; and, (2) *the degree of 'falsifiability' can serve as a measure of aesthetic worth*. Before proceeding any further let me explain the analogy between scientific and aesthetic falsifiability.

I

The basic idea behind Popper's demarcation criterion is quite simple: a hypothesis is scientific only in so far as it is falsifiable. This means that there must be some logically possible states of affairs which are prohibited by the hypothesis; it must be possible that the hypothesis could clash with some conceivable experience. Or, as Popper puts it: 'Every . . . scientific theory is a prohibition: it forbids certain things to happen. A theory which is not refutable by any conceivable event is non-scientific. Irrefutability is not a virtue of a theory (as people often think) but a vice'.³ Non-scientific hypotheses, such as 'God exists', for example, are not refutable or falsifiable, since this hypothesis does not put constraints on any conceivable states of affairs.

Popper's contention that the degree of falsifiability can serve as a measure of empirical content, and thus as an (a priori) measure of scientific or epistemic worth, is also quite simple. Science is seeking theories which are highly informative, rich in their empirical content; theories which have high predictive and explanatory power. But such theories are also highly falsifiable, since a failure of any of their predictions amounts to their falsification. Theories which have high predictive power are rich in their empirical content, and run a greater risk of clashing with observations or experimental results. The empirical content of a theory is thus proportionally related to the number of its potential falsifiers. The more the theory says the more falsifiable it is. Thus a good scientific theory is one which is highly falsifiable but has not so far been falsified. Popper also characterizes the *ideal* scientific theory in terms of optimal falsifiability. Let me quote again:

Let us now imagine that we are given a theory, and that the sector representing the basic statements which it forbids becomes wider and wider. Ultimately the basic statements *not* forbidden by the theory will be represented by a narrow sector. . . . A theory like this would be very easy to falsify, since it allows the empirical world only a narrow range of possibilities; for it rules out almost all conceivable, i.e., logically possible, events. It asserts so much about the world of experience, its

empirical content is so great, that there is, as it were, little chance for it to escape falsification. . . . All the events or classes of occurrences which we actually encounter and observe, and only those, would be characterized as permitted.⁴

An ideal scientific theory would thus be one which is maximally falsifiable, yet so far, actually unfalsified.

Let us now turn to the concept of aesthetic rightness and see how the principles of Popper's falsificationism can be applied in its analysis. What could it *mean* to say that a work of art is right? Since this concept allows for degrees, let us first consider the limiting case of *absolute rightness*. To say that a work of art is absolutely right is to say that it has no shortcomings. The notion of absolute rightness clearly implies the absence of deficiencies of any sort whatsoever. This in turn means that every constitutive feature of the work is in its place, exactly where it should be. Such a work cannot be improved, for if it could, it wouldn't be quite right. It can, on the other hand, be easily impaired, spoiled, damaged or 'falsified' by alterations of its constitutive features.

The link between the concept of aesthetic rightness and that of falsifiability is, I think, beginning to surface here. Obviously, Popper's concept of falsifiability cannot be applied to aesthetics literally, for works of art are not statements that can be contradicted by observation reports, or rendered false by states of affairs. But the analogy between the ideal scientific theory and an ideal work of art suggests itself nevertheless. For we could say that an *ideal* work of art is maximally 'falsifiable' in the sense that *any* alterations of its features would cause an aesthetic damage, i.e., would make it somewhat wrong or false.

We could say that an *ideal* work of art 'forbids' any departures or deviations from its actual forms. Thus all those features that such a work actually exemplifies, and only those, could be characterized as 'permitted'. A deviation from the actual form of a work of art which would be aesthetically beneficial would, *ipso facto*, point to some shortcomings. As the *actual* falsification of a scientific theory by a 'forbidden' event shows that something is wrong with the theory, likewise an alteration which would improve a given work of art would show that there is something wrong with that work of art. Since by definition an absolutely right work does not allow for such alterations, an ideal work of art, like an ideal scientific theory, could be said to be maximally 'falsifiable', yet actually 'unfalsified'.

An absolutely right work of art is thus one which can only be spoiled but not improved by alterations. The opposite limiting extreme—an absolutely wrong work of art—could be conceived of as one which can only be improved but not spoiled by alterations. The two limiting cases may have no real instances. We can, nevertheless, assume a continuum between the two extremes, a continuum on which *real* works of art can be projected. Exquisite works of art could be considered as being relatively close to the limiting case of maximally 'falsifiable', yet actually unfalsified work, since such works would be easy to spoil but difficult to improve. Good works of art could thus be said in this sense to be

more 'falsifiable' than bad ones, and hence the degree of 'falsifiability' could be seen as a measure of aesthetic rightness.⁵

It is evident that works of art could (in principle) be improved or damaged by alterations. However, it is also possible that some alterations are aesthetically inconsequential, i.e., that some changes or transformations would neither improve nor spoil the aesthetic quality of the work. For example: transposing the tune of *Frere Jacque* from C-major to, say, F-major would be unlikely to affect its aesthetic qualities (whatever these may be). It is important to note, however, that this cannot be true of *every* transformation or alteration of a work of art. For clearly, if no alteration of the constitutive features would affect the aesthetic quality of an object, the object could hardly be said to function aesthetically. We could say that such an object would be in principle 'unfalsifiable', in the sense that no alteration would either damage or improve it. But if no departure from the actual form of the object would make any aesthetic difference, we couldn't but conclude that its form is not significant, that we do not consider it a work of art. Falsifiability in principle (i.e., possibility of damaging and/or improving a work of art by alterations) could thus be seen as a demarcation criterion of aesthetic character. An object can be considered a work of art only if it is *effectively falsifiable* in this sense. In the preceding section we have noted that good works are actually more falsifiable than bad ones. But both, good as well as bad works, have to be falsifiable in principle in order to count as works of art.

So far, we have been concerned with the semantic question: what does it *mean* to say that a work of art is right? Let us now turn to the epistemic question: how could we *know* that a work of art is right? What could *inform* our judgement about rightness or wrongness of works of art? Given the uniqueness of works of art, how could we justify claims about their rightness? The assessment of the aesthetic rightness of a work of art primarily consists of the assessment of how well *its* specific constitutive elements are integrated. Or, as Richard Wollheim puts it, 'the coherence that we look for in a work of art is always relative to the elements that the artist is required to assemble within it.'⁶ How could we then know whether the constitutive features of a given work are in their place, exactly where they *should* be? How could we, for example, justify a claim such as: feature F of work W is (is not) in its place, exactly where it should (should not) be? I suggest that we can back up such claims by juxtaposing W with its own versions or alternatives which differ from W only with respect to F. If we find an alternative W' which strikes us as aesthetically superior to W, we could infer that F is not quite in its place. If, on the other hand, all the alternatives turn out to be aesthetically inferior to W, we may conclude that F is quite right. We could thus learn about rightness or wrongness of works of art by comparing them to their own versions. Alternatives which are inferior to W could be regarded as confirming instances of the claim that W is right, while those alternatives that are superior to W can be regarded as disconfirming instances of

such judgement. We could thus say that aesthetic value judgements could be tested or justified by juxtaposing the work of art under consideration with its own alternatives.

II

Before proceeding any further a few words should be said about the concept of alteration. Though this concept will figure prominently in much of what follows, I cannot (for reasons which will soon become apparent) offer anything like a formal definition, and the application of this key concept will ultimately rest upon our intuitive understanding. Let me, nevertheless, make a few remarks about the meaning of the term 'alteration' in the sense in which it will be employed here.

The notion of alteration clearly implies change, but evidently not every change will count as an alteration. A change in a work of art which would make it difficult to recognize its basic dominant features would not be normally considered an alteration. Intuitively speaking, an alteration, or an alternative of a given work of art, can be said to exemplify one of *its own* unrealized possibilities. The question is when can we say that something exemplifies an unrealized possibility of a given work of art rather than that we have two altogether different works of art. The answers will obviously differ from case to case, since the type and range of permissible alternatives will depend on the specific features of each individual work. The type and range of permissible alterations will depend on the 'inner logic' of the work, on what its dominant, determining, or 'essential' features are, and what its subsidiary or 'accidental' properties are. We could say that every individual work suggests its own alternatives. Generally speaking we may say that a change in a work of art will be considered an alteration only if it does not shatter its *basic perceptual Gestalt*. A work will constitute an alternative or a version of another only if we can perceive the same basic *Gestalt* in both.

It should be emphasized that we cannot offer a formal criterion for what is to count as an alteration, for this may depend on stylistic considerations, on perceiving the work in an appropriate category, on the context of presentation, sometimes even on the artist's intentions. It should thus be clear that the authority to determine whether a change in a work of art does or does not constitute an alteration ultimately rests with the art critic and not with the philosopher.

Alternatives are conceived of as being roughly of two kinds: (1) those resulting from local changes and adjustments, where most of the constitutive elements are left intact, and (2) those resulting from overall transformations which may change all the constitutive elements while preserving their relations and structural properties. Making revisions in a musical piece, editing a poem, or re-touching a photographic print would be examples of alterations of the first kind; transposing a musical work into another key, translating a poem, or

making the photographic print larger or smaller would be examples of alternatives of the second kind.

Naturally, the concept of alteration is a very fuzzy one, and there are bound to be many borderline cases. The concept of alteration is, nevertheless, clearly a meaningful one, since given any work of art we could easily think of paradigmatic examples of changes which would shatter its basic *Gestalt*, and changes which would not.

Assuming that the concept of alteration is sufficiently clear for our present purpose, let us look again at the claim about the testability or justifiability of aesthetic value judgements. We have suggested that alternatives which are inferior to a given work of art could be seen as confirming evidence for claims about its rightness, while superior alterations would count as disconfirming instances of such aesthetic value judgements. However, the determination of whether an alteration, or an alternative is superior or inferior to a given work of art also involves aesthetic value judgement. But if this is so, isn't our suggestion about the justifiability of aesthetic value judgements circular? Aren't the judgements which are to be justified involved in the identification of their confirming or disconfirming instances?

The answer is that although certain kinds of aesthetic discriminations or value judgements are indeed presupposed, these are different from, and independent of, the aesthetic judgements which we want to justify. What is presupposed is that given a work of art and its alternatives, one is able to judge which alterations would improve the work and which would cause aesthetic damage to it. These value judgements are *comparative*, their basic logical structure is that of two-place relation (i.e., 'W' is better (or worse) than W'). The aesthetic value judgements which we want to justify are cardinal, or categorical judgements, and their basic logical structure is that of (simple or complex) one-place predication (i.e., 'W is right (or wrong)', or 'W is right to the degree n'). Judgements of alterations and judgements of aesthetic value of works of art are thus judgements which have *different logical structure*. It should be also noted that in order to judge whether an alternative W' of a given work of art W is better (or worse) than W, we neither have to assess the value of W itself, nor that of W' itself. We can determine whether W' is better (worse) than W, without being committed to any particular value judgement about W. Judgements about the relative merits of alterations are thus, in this sense, independent of the judgements of aesthetic value of works of art as such. It should also be noted that comparative judgements of alterations are considerably more simple than judgements of the aesthetic value of works of art. For judging the aesthetic value of a work of art as a whole involves a judgement as to how well *all* of the constitutive elements or features fit together. Judgements of the aesthetic impact of alterations, on the other hand, involve a relatively simple judgement pertaining to how *one* of the work's features fits the remaining whole, how *one* feature is integrated with the rest.

In view of this relatively simple structure of the comparative judgements of alterations, it seems plausible that there will be considerably more consensus concerning judgements of alterations than about aesthetic value judgements of works of art as such. For it seems likely that even people with different opinions about some picture, novel, or musical piece could agree as to whether suggested alterations constitute improvement or damage. We can often judge with a considerable confidence whether alterations are beneficial or detrimental to a given work of art, without being sure, or having any definite opinion, about its overall merits. I shall call such comparative judgements of alterations *basic aesthetic judgements*. These basic aesthetic judgements can be conceived of as playing a role in the proposed model of aesthetic evaluation of works of art analogous to the role that 'basic statements' play in the Popperian model of epistemic evaluation of scientific theories.

The analogy between the basic aesthetic judgements and 'basic statements' pertains both to their function and their status. Basic statements serve as confirming or disconfirming evidence for claims that a scientific theory under consideration is true. In a similar manner basic aesthetic judgements can be conceived of as confirming or disconfirming evidence for claims that the work of art under consideration is right. Although basic statements are not considered by Popper as proven, non-revisable, absolutely certain, or indubitable facts, their truth value is generally considered less problematic and more easy to determine than that of the hypothesis which is tested against them.⁷ Analogically, though basic aesthetic judgements, i.e., judgements of alterations, are not considered as self-evident, they are considered less problematic and easier to determine than judgements concerning rightness of works of art.⁸

Let us come back now to our assumption that there is likely to be more consensus at the level of the basic aesthetic judgements than on the level of overall evaluation of works of art. If this assumption is true the basic principles of our model can be suggested as a piecemeal method for aesthetic persuasion. They could be suggested as basic guidelines for a method by which an art critic could, in a piecemeal manner, demonstrate his claims concerning shortcomings or aesthetic merits of works of art.⁹

III

One of the basic features of Popper's 'falsificationism' is the emphasis on the methodological implications of the logical asymmetry between verification and falsification of scientific hypotheses. A single accepted basic statement about a non-black raven falsifies the hypothesis 'All ravens are black'. No number of accepted basic statements about black ravens, however, is sufficient for the verification of this hypothesis. With a certain amount of simplification we may thus conclude that while we may know that the hypothesis under consideration is false, we can never know whether it is true.

I want to suggest that basically the same asymmetry pertains to the judge-

ments of rightness and wrongness of works of art, or even to the judgements of rightness and wrongness of its constitutive features. For, in order to establish that feature F is in its place, i.e., that it is a 'good-making feature', we have to survey *all* of its alternatives, and determine that they are all inferior to F. It would be, however, sufficient to find a single aesthetically superior alternative to F in order to show that F is not quite right. This asymmetry between the verification and falsification of claims about the rightness of features applies *a fortiori* to the claims about the rightness of works of art as such. We could thus say that while we may know when a work of art under consideration is wrong, we can never be sure that it is right.

I believe this asymmetry manifests itself in everyday contexts. Think, for example, of the following situations: in front of you is an exquisite work of art and you are asked to explain—to somebody who does not perceive it as such—why it is so good. Compare this to a situation in which you are faced with a bad work of art and you have to explain—again to somebody who does not perceive it as such—why it is bad. From my own experience it seems to me that we find it much more difficult to explain why a good work of art is good than to explain why a bad work is bad. In the first case, we often feel completely at a loss, we don't know where to start. We might often feel like saying: 'Either you see it or you don't; there is not much one can do by way of arguing, demonstrating or pointing to features'. For to show or explain that the work is right one would have to demonstrate that no alternative would improve it. But to do this, one would have to go over all the alternatives of the given work—which seems an almost impossible task. To explain what is wrong with a given work of art, on the other hand, may simply consist of suggesting a single beneficial alteration, which *ipso facto* points to a deficiency.¹⁰

Let us now consider two likely objections: the first pertains to the somewhat sceptical, or at any rate negativist, consequences of the asymmetry between justification of positive and negative aesthetic value judgements. For it seems to follow that although we may explain deficiencies of works of art, it is practically impossible (owing to the vast number of alternatives to be surveyed) to justify claims about the merits of works of art. The proposed method for justification of aesthetic value judgements thus seems severely limited.

The second objection could be stated as follows: according to the conclusion reached in section I, any alteration which is detrimental to a given work of art should be considered as a confirming instance of positive aesthetic judgements. Every such alteration should (to some degree) raise the probability of the claim that the work under consideration is right; it should serve as a piece of positive evidence for such claims. Yet this does not always agree with our intuitions. Imagine that an art critic who wants to justify his positive assessment of Canaletto's paintings of Venice would urge us to compare them with alternatives in which the sky would be painted green. We would readily agree that such alternatives would be aesthetically inferior, yet we would be reluctant to accept

them as positive evidence, or genuine confirmation instances of the claim that these paintings are aesthetically valuable. For, given any work of art, we could easily conjure up all sorts of such clearly inferior alterations, yet we would feel that they reveal nothing about the actual aesthetic qualities of the work.

Both problems are, I think, readily resolved by adopting Popper's conception of corroboration (or genuine confirmation), which also lends itself to adaptation to aesthetics. For Popper, a theory is genuinely confirmed *only if it is genuinely tested by an attempt to falsify it, and this attempted falsification turns out to be unsuccessful*. Let me quote Popper again: 'Confirming evidence should not count, *except when it is the result of a genuine test of the theory*; and this means that it can be presented as a serious, but unsuccessful attempt to falsify the theory'.¹¹

How are we to translate this principle into our aesthetic model? To falsify a theory is to falsify the claim that the theory is true (e.g., by pointing to a counter-example). But what does it take to falsify the claim that a work of art *W* is just right? The aesthetic counter-example to such a claim would consist in producing an alternative, or a version of *W*, which would be aesthetically superior to *W*. Popper's principle could thus be translated into our model as follows:

Aesthetically inferior alterations of a work of art *W* should not count (as evidence for positive judgement of *W*), *except when it constitutes a genuine test of *W*, and this means that it can be presented as a serious, but unsuccessful attempt to improve *W*.*

This means that only such alterations which could *prima facie* be seen as serious candidates for improvement should be taken into consideration; and only when such alterations turn out to be, *after inspection*, aesthetically inferior after all, do we have a genuine confirmation of a positive aesthetic claim. The adaptation of Popper's principle drastically reduces the number of alternatives that we have to consider in order to demonstrate or justify positive aesthetic claims. It not only rules out such freaky alternatives as those with green sky in Canaletto's pictures, since (even before actually comparing them to the 'original' work) we would not consider such alternatives as serious candidates for improvement. It also rules out alterations which do not conform to the general conception of the work, to its stylistic particularities, to its inner logic and spirit. By restricting relevant alternatives to those that could be *prima-facie* credible candidates for improvement, the range of alternatives with which one has to compare a given work of art in order to justify its positive assessment, need not be unmanageably large.¹²

If this is so, it should be (at least under some circumstances) practically possible for an art critic to demonstrate or explain his positive assessment of a work under consideration. By juxtaposing alternatives, an art critic should be able to convince his audience about the work's merits. He should be able to bring it about that his audience 'sees' what is to be seen in a worthwhile work of art.

Let me illustrate this by an example from my own experience: recently, I was present at a musical evening where a musicologist was analysing Beethoven's piano sonata No. 7 (Op. 10, no. 3, in D). At one point he said that the second phrase of the first movement (bb. 4–10) constitutes a brilliant and ingenious breaking of the rhythmic symmetry of the whole phrase, which enhances the aesthetic value of the piece. Some of the less musical people in the audience, including myself, didn't quite 'see' this at first. I thus asked the musicologist if he could explain what is so good about this phrase. Instead of verbal explanation he suggested a number of alternatives to the passage in question; he played the first movement with certain alterations. Although these alterations complied with the canons of the classical sonata and were executed in the spirit of Beethoven's work they were clearly recognized by all as aesthetically inferior, and those who at the beginning didn't quite grasp the beauty of the first movement began to see it quite clearly. After listening to four or five such alternative versions everybody was convinced that the musician had justified and convincingly demonstrated his claim.

The adapted Popperian principle, which stipulates that only alterations which would *prima facie* be seen as credible candidates for improvements are to be considered as relevant, makes somewhat heavy demands on the art critic. For if the art critic wants to engage in aesthetic persuasion as suggested here, if he wants to bring his audience to 'see' what is to be seen in works of art, he has to be armed not only with a considerable amount of art-historical knowledge, he also has to have a certain amount of *creative imagination*. The creative imagination required from the art critic is not the same as the creative imagination required from the practising artist. We need not expect the art critic to be able to produce, or even conceive of, original works of art. The creative imagination expected from the art critic is confined to the ability to suggest alterations of existing works of art, alterations that would be *prima facie* acceptable as credible candidates for improvement. But even this may not be an easy task, especially when it comes to really good works of art.

IV

When we invoked (in section I) the notion of aesthetic 'falsifiability' we noted that good works of art are more 'falsifiable' than bad ones, in the sense that it is easier to spoil them and harder to improve them by alterations of its constitutive features. Let us now try to express this intuition in a more orderly manner. Let us assume that each work of art (*W*) has some definite number (*K*) of alternatives, that it can be altered in *K* different ways. Each of these alterations must fall into one of the following three categories: Either the alteration

- A:** *causes some aesthetic damage to W, or*
- B:** *aesthetically improves W, or*
- C:** *does not aesthetically affect W.*

Let **a**, **b**, and **c** stand for the *number* of alterations which fall under the categories

A, **B**, and **C** respectively.¹³ The idea that the degree of ‘falsifiability’ can serve as a measure of aesthetic worth can be now expressed as follows:

$$V(W) = (a - b)$$

The greater the number of the aesthetically damaging alterations (**a**), and the smaller the number of the beneficial alterations (**b**), the greater the aesthetic value (**V**) of a work of art (**W**). The aesthetic value of a work of art could thus be tentatively seen as being directly proportional to the number of its **A**-type alternatives *minus* the number of its **B**-type alternatives.

I would like to suggest that the above formula captures the basic intuitions pertaining to the classical notion of *unity*. For a maximally unified work could only be spoiled but not improved by alterations. Accordingly **V(W)** reaches its highest value when **b=0** while **a** is maximally large. It also accords with our intuitions that unity decreases when the number of **B**-type alternatives increases at the expense of **A**-type alternatives, i.e., when the work could be improved in many ways but damaged only in few.

While proposing the above formula as an explication of the concept of *unity*, I do not think it reflects the overall structure of our aesthetic value judgements. For, we do not judge the aesthetic merits of works of art *only* by ascertaining how unified or well balanced they are. A minimalist painting of a black circle in the centre of a white canvas may well be so executed that it could only be damaged but not improved by alterations, i.e., it would be optimally unified. This does not mean, however, that we would admire it as a supreme artistic achievement. The reason is that such a painting lacks the dimensions of *complexity* and *intensity*, which are both positive factors in the overall aesthetic evaluation.¹⁴ What we admire in art is not simply unification *per se*, but harmonization or unification of highly complex and intensive forms. Complexity and intensity should thus be represented as *amplifying* factors of the unity component of our formula. Let me start with the *complexity* factor.

From Aristotle to Monroe C. Beardsley, complexity has been thought of in terms of heterogeneity and multi-dimensionality. The more complex the work of art, the greater the plurality and diversity of its constitutive features. I suggest that these intuitions can (at least partially) be accounted for by representing the degree of complexity by the total number of its alternatives, i.e., by the number of ways in which a work could be altered, without shattering its basic perceptual *Gestalt*. The degree of complexity could thus be represented in our schematic model by **K**, or (which comes to the same) by the sum (a+b+c). Our formula should thus be amended as follows:

$$V(W) = (a - b) \cdot (a + b + c)$$

Let us consider some examples:

Though there may be notable differences in complexity between different sonatas, quartets, and symphonies, on the whole we judge symphonies to be more complex than quartets, and quartets more complex than sonatas. We might say that the number of different instruments enhances the complexity of the work. But we could also say that the increase in the number of instruments employed increases the number of ways in which the piece might be altered without altering its basic perceptual *Gestalt*. Revisions in a passage of a single instrument in a symphony is unlikely to affect its basic structure. A comparable revision passage in a quartet or a sonata, however, might. Similarly, novels will, in general, permit more alterations than short stories or poems. Accordingly, they could be regarded as more complex.¹⁵ Likewise, it could be argued that owing to the abundance of ornamental and other subsidiary elements, Baroque structures allow for more alterations than Byzantine ones. Accordingly, we generally judge Baroque churches to be more complex than Byzantine ones.

Complexity is thus conceived as the total number of alterations a work of art can be subjected to. Another way to express the same idea is to think of the degree of complexity as the number of ways in which a work of art could *potentially* go wrong. This brings us back to the idea of falsifiability. For we may also say that the degree of complexity of a work of art is directly proportional to the number of its *potential falsifiers*, i.e., to the number of ways the work could be altered, and thus *potentially* spoiled. The degree of complexity could, in this way, be seen as the degree of *potential falsifiability*. This could be contrasted with the degree of unity which, in our Popperian terminology, should be designated as the degree of *actual falsifiability*. For in order to assess the degree of complexity of a work of art we only have to know what should count as its potential falsifiers. We do not have to know what should count as its *actual falsifiers*, i.e., which of the alterations would *actually* spoil rather than improve it. In order to assess the degree of unity, however, one has to assess the number of alterations which would *actually* damage the work, the number of ways in which the work could *actually go wrong*. The degree of unity could thus be seen proportional to the number of *actual falsifiers*.

Let us now turn to the concept of intensity. What are the intuitions associated with this notion? One could say that intensive works leave a strong aesthetic impact; they are highly expressive. As a rule, works of art which strike us as highly intensive are very tightly and economically organized. All the constitutive elements function aesthetically, there are very few redundancies. It should also be noted that high intensity (just like high complexity) is *not* in itself a guarantee of rightness. Highly intensive works can be both good and bad. Indeed, extreme beauty and extreme ugliness are both aesthetically highly intensive—highly expressive. I suggest that the degree of intensity could be represented as the ratio between the number of aesthetically significant alterations, i.e., $a + b$, and the number of aesthetically neutral alterations, i.e., c ; that

is, by the ratio $(a+b)/(c+1)$ ¹⁶ Our formula should be thus further amended as follows:

$$V(W) = (a-b) \cdot \frac{a+b}{c+1} \cdot (a+b+c)$$

Let us now look at some examples: we have noted above that novels should be, on the whole, considered more complex than poems. We didn't want to imply, however, that novels are therefore a priori likely to be better than poems. The point is that the lower complexity of poems is likely to be compensated by their higher intensity. The reason is this: imagine taking a novel and replacing each noun (or verb, for that matter) by its synonym (assuming there is one). Each such replacement is likely to count as an alteration, i.e., is likely to preserve the basic structure of the work. Some such alterations might conceivably damage the novel, some might improve it, but it is quite clear that the vast majority of *such* alterations would not aesthetically affect the work.¹⁷ Let us now imagine doing the same thing to a poem. Admittedly some such replacements might not count as alterations since they might shatter the basic *Gestalt* of the work. The point is that only relatively few of those replacements that *would* count as alterations will be aesthetically insignificant. The number of aesthetically neutral alternatives is likely to be vastly outnumbered by the aesthetically significant ones. This means that the intensity component, i.e., the $(a+b)/(c+1)$ component, of poems is going to be relatively high compared with that of novels. Even a very bad poem is likely to be relatively highly intense.

Let us, for argument's sake, try to challenge this last claim. Let us try to imagine a poem with an extremely low intensity. What would this mean? It would mean that almost every alteration of such a poem would leave us aesthetically indifferent, i.e., that no alterations would improve or damage its aesthetic appeal. But a little reflection shows that this is impossible. It is not that such a poem would be extremely bad. It wouldn't be a poem at all. Indeed, we would hardly relate to such an entity as to a work of art, for it could hardly be said to be functioning aesthetically at all.

Our hypothetical example indicates that a certain minimal measure of intensity is a *sine qua non* for being a candidate for aesthetic appreciation or for the title 'work of art'. This brings us back again to the notion of falsifiability. In section I we have noted that in order for an object to be considered a work of art it must be *falsifiable in principle*, i.e., it must be possible for an object to be aesthetically damaged or improved by alterations. If all the alterations would be of the kind C, i.e., if we would have no preferences with regard to alternatives, the work would be *effectively unfalsifiable*, and we couldn't but conclude that it doesn't function aesthetically. The degree of intensity or the degree of aesthetic functioning could be thus thought of as the degree of *effective falsifiability*.

The above considerations force us to take another look at our formula. In its

present form the formula could get the value zero under two different sets of circumstances: (1) when the number of **A**-type alterations equals the number of **B**-type alterations (when $\mathbf{a}=\mathbf{b}$), and (2) when all the alterations are of the type **C**, i.e., when $(\mathbf{a}+\mathbf{b})=\mathbf{0}$. These two possibilities, however, represent quite different situations. The first represents a state of affairs when, roughly speaking, the bad-making qualities are balanced by the good-making ones. The second represents circumstances when alterations have no aesthetic impact on the work under consideration. In the first case we could speak of 'mediocre' works of art, and it seems quite appropriate that the formula assigns them zero value (since good works get some positive value while bad works some negative one). In the second case, however, we do not have, as we have seen, a mediocre or bad work of art; we have no work of art at all. It is thus inappropriate in such cases for our formula to have a value 'zero'; the function should be *undefined*—indicating that the object under consideration does not function aesthetically. This deficiency could, however, be easily amended, and our formula can finally be re-written in its definitive form as follows:

$$V(W) = (\mathbf{a}-\mathbf{b}).(\mathbf{a}+\mathbf{b}+\mathbf{c}). \frac{\mathbf{I}+\mathbf{c}}{\mathbf{a}+\mathbf{b}}^{18}$$

Let me conclude with a remark pertaining to the status of the proposed model. The main purpose of the formula is to lay bare the basic logical structure of aesthetic value judgements. Its quantitative algebraic form is not intended to suggest that one could actually calculate a number which would reflect the aesthetic value of the work of art under consideration. Rather, it is intended to show that the aesthetic value of works of art could be thought of as a function which takes alterations of different sorts as its arguments.¹⁹ The three components of the formula could also be seen as a suggestion for explication of the classical notions of *unit*, *complexity* and *intensity*—notions which were hitherto understood only on a purely intuitive level as primitive concepts. The formula lays bare the internal structure of these concepts and reveals some interrelations and interdependencies between their constitutive elements.²⁰

It should be stressed that I do not claim that we actually form our aesthetic judgements in accordance with our formula. What I claim is that the principles incorporated in our model reflect our aesthetic preferences. The proposed model should be seen as a suggestion for a *rational reconstruction* of our aesthetic value judgements and aesthetic preferences, just like the Popperian (or for that matter Carnapian) model should be seen as suggestions for a rational reconstruction of epistemic value judgements and scientific preferences. Carnap didn't think that scientists who have to evaluate various hypotheses and theories actually do, or should, proceed by state descriptions, assessments of probability and calculations of *c**-functions. Nor did Popper want to suggest that scientists do, or should, actually count and compare potential falsifiers when they have to

choose between competing theories. They saw their models as suggestions for a *rational reconstruction* of accepted scientific practice. They intended to show that scientific choices and preferences are reflected by, and can be accounted for by, the normative principles of their respective models. In a similar manner, I am not suggesting that we actually do, or should, arrive at our aesthetic assessments by juxtaposing alternatives, sorting them into requisite classes and calculate various algebraic functions with their cardinal numbers in accordance with our formula. What I am suggesting is that accepted aesthetic judgements and preferences are reflected and can be accounted for by the normative principles incorporated in our model.

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REFERENCES

- ¹ One of the reasons for this preference is that many great works of art (e.g., Picasso's *Guernica*, or Kafka's *Trial*) can hardly be described as beautiful
- ² See *Ways of Worldmaking* (Sussex Harvester Press, 1978), esp. Ch. VII
- ³ *Conjectures and Refutations* (London Routledge, 1963), p. 36.
- ⁴ *The Logic of Scientific Discovery* (London Hutchinson, 1959), p. 113
- ⁵ This principle will be further developed below in section IV.
- ⁶ *Art and its Objects*, 2nd ed (Cambridge U.P., 1980), p. 141.
- ⁷ Testing of theories by basic statements is not considered by Popper as duels between hypotheses and hard facts but rather as higher level theories being contested by accepted lower level theories
- ⁸ The difference between the basic aesthetic judgements and judgements of rightness of works of art is not that the latter involve aesthetic appreciation while the former are merely descriptive judgements of facts. Aesthetic intuition is involved in both types of judgement. The difference is rather that in case of the basic aesthetic judgements the intuitions are generally stronger, more reliable and more inter-subjective than in the case of aesthetic value judgements of works of art as such. The relation is that between lower level aesthetic judgements and higher level ones.
- ⁹ This will be illustrated at the end of section III
- ¹⁰ The asymmetry in question pertains to the 'context of justification', rather than to the context of discovery—to borrow another familiar distinction from the philosophy of science. In other words, I am *not* claiming that it is, in general, more difficult to perceive beauty than to perceive ugliness, or that noticing merits is less immediate than noticing deficiencies. What I suggest is that it is much easier to *explain, demonstrate, or justify*, that a work has shortcomings than it is to explain, demonstrate or justify, why certain features are good-making features of the work
- ¹¹ *Conjectures and Refutations*, p. 36
- ¹² It should be noted that the asymmetry between the justification of negative and positive aesthetic judgements still holds (To justify a claim about a deficiency it is sufficient to point to a single aesthetically superior alternative. Pointing to a single inferior alternative, however, wouldn't be equally persuasive in the attempt to demonstrate a positive feature of a work of art.) The sceptical conclusion, i.e., that it is practically impossible to explain, or demonstrate artistic excellence, has been, however, considerably weakened
- ¹³ 'a' thus stands for the number of alterations by means of which \mathbb{W} could be aesthetically damaged. 'b' stands for the number of alter-

ations by means of which W could be improved, while 'c' stands for the number of alterations that have no aesthetic impact on W . Roughly speaking, alterations of the type **B** point to shortcomings, or bad-making features of W , alterations of the type **A** point to some positive, or good-making features of W , while alterations of the type **C** point to features which are of no aesthetic significance.

¹⁴ The traditional conception of beauty as unity in complexity, or diversity, goes back to Plato and Aristotle. More recently, mainly owing to Monroe C. Beardsley, the concept of intensity has been added to the list in order to capture the intuition that art strives for unification of diverse and highly *expressive* forms.

¹⁵ We shall see below that low complexity is often compensated by high intensity.

¹⁶ The reason for replacing 'c' by 'c+1' is a technical one. Intensity should be maximal when the work has only aesthetically significant alternatives, i.e., when $c=0$. We thus add '1' to the denominator to ensure that in such cases the function acquires its maximum value— $(a+b)/1$ —rather than be undefined—due to division by zero (when $c=0$).

¹⁷ I am not suggesting that there are no other kinds of alterations which are aesthetically significant. Those other kinds of alterations

(e.g., revisions of whole sentences) would, however, obviously also affect less complex works.

¹⁸ We have inverted the ratio $(a+b)/(c+1)$ and re-written it as $1/((c+1)/(a+b))$. For all values of a, b, and c, the value of the two expressions is the same, *except* in the case when $(a+b)=0$, when the value of the first expression would be 'zero', while the second expression—due to indivisibility by zero—is undefined.

¹⁹ More specifically, the model is intended to show that aesthetic value could be thought of as a function which monotonously increases with the number of **A**-type alterations, decreases with the number of **B**-type alterations, and also (though not in the same way) with the number of alterations of the type **C**.

²⁰ Some of these interrelations might well be worth further exploration. For reasons of space, however, this will have to be done in another paper.

I want to thank Dr Yael Cohen and Professor Avishai Margalit for their very helpful criticism of an earlier version of this paper. An earlier draft was read at the Twenty-first National Conference of the British Society of Aesthetics held in London in September 1987.