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SCIENTISTS' AESTHETIC JUDGEMENTS

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1. INTRODUCTION

By now many authors have remarked upon the incidence in scientific practice of aesthetic evaluations of theories.[1] The task for aesthetics is to construct a model of the exercise of aesthetic judgement in science; that is to say, a theoretical interpretation of scientists' apparent practice of subjecting their theories to aesthetic evaluations. One of the chief tasks of such an interpretation is to elucidate the relationship between scientists' aesthetic evaluations and the logico-empirical, or truth-related, judgements which they simultaneously pass on their theories.

This paper attempts to contribute to such a model by exploring the following suggestion: in passing an aesthetic judgement on a theory, a scientist is forming an evaluation of the theory's aesthetic qualities for their own sake and without ulterior interest; in particular, such a judgement is not intended as part of a procedure to ascertain the degree of truthlikeness or empirical adequacy of the theory. This suggestion will ground a distinction between scientists' logico-empirical and aesthetic evaluations of their theories: to evaluations of the latter class will be applied the aesthetic theory of disinterested attention.

The paper will begin by recalling a twentieth-century formulation of the view that aesthetic judgements are disinterested. Section 3 addresses the debate in the philosophy of science, and shows how the suggestion that scientists' aesthetic evaluations of their theories are extra-empirical arises in the discussion of the underdetermination of theory-choice by empirical criteria. In section 4, evidence will be presented from scientists' methodological statements that they conceive of their aesthetic evaluations of theories as disinterested in the sense specified. Section 5 will look back at the eighteenth-century origins of the doctrine of disinterested attention, and will show that the interpretation advanced here of scientists' aesthetic judgements is married naturally to the doctrines of Shaftesbury and Hutcheson.

2. DISINTERESTED AESTHETIC JUDGEMENT

Here is a theory about the mode of attention which is activated in aesthetic perception. There are perhaps many such modes which one may assume in perception, each characterized typically by the aims or interests by which the perception is animated or in view of which it is conducted. One may for instance gaze upon a gem to estimate its monetary value or survey a chess-

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board with the interests of Black at heart. According to the theory developed here, aesthetic perception is marked by attention for the object's aesthetic qualities for their own sake, and by disregard for any ulterior interests—such as utilitarian interests—which the observer may have in the object.[2]

E. Bullough characterizes aesthetic perception as the mode of attention which interposes 'psychical distance' between an observer and his or her objects: because of this detachment, aesthetic perception concerns itself with only the non-utilitarian values of its objects, and any judgements arising in the course of this perception are in this sense 'disinterested'.[3]

In developing this view, Bullough contends that broadly speaking the values which an object has are of two kinds. The aesthetic values of the object are its intrinsic merits, and are perceived through the interposition of 'psychical distance'; the other set contains the several categories of utilitarian values which an object of perception may possess, and which are apprehended when in the act of perception no distance is taken from the object. As Bullough expresses it, 'Distance . . . supplies one of the special criteria of aesthetic values as distinct from practical (utilitarian), scientific, or social (ethical) values.'[4] One and the same object is clearly susceptible to being perceived under both the aesthetic and the utilitarian mode; one thus envisages attributing to an object a degree of aesthetic value conferred in the course of disinterested perception, and separately a degree of practical value—in one of the forms that this value can assume—awarded in the act of utilitarian perception.[5]

Let us now consider how this view might apply to the perception of scientific theories. Bullough does not directly include theories among the potential objects of aesthetic perception, but he refers to an object's 'scientific values' as distinguished from its aesthetic values. The 'scientific values' of a scientific theory might be interpreted as its empirical or predictive powers, applied and revealed in experimental tests and technological exploitation; its aesthetic values might be retraced to its properties of simplicity and symmetry, say.[6]

Once these associations are made, a reading of Bullough prompts us to consider that scientific theories may be judged on two separate evaluative canons. One is a utilitarian canon, composed presumably of logical and empirical evaluative criteria aiming to ascertain the predictive worth of the theory, or its 'scientific' value in the narrow sense of this term; the other is an aesthetic canon, which on Bullough's conception is applied through maintaining towards the object an attitude of disinterestedness for utilitarian ends. As the next section will show, the implications of this suggestion cohere closely with the outcome of discussions in scientific methodology.

3. AESTHETIC CRITERIA AND THE UNDERDETERMINATION OF THEORY-CHOICE

On most simple normative models of science, a theory is to be valued for the degree to which it achieves observational success. Ultimately, a theory's observational success would be demonstrated by its according with evidence

accumulated from disparate sources over unlimited time-spans. But unlimited times are not at the disposal of researchers hesitating between alternative theories: the working scientist requires criteria of prompt application able to indicate whether a theory is likely to demonstrate observational success in the longer term. A scientific community tacitly constructs a set of such criteria by considering what features exhibited by a theory are indicative of its likely long-term observational success. Since observational success would be a logico-empirical attainment of a theory, the criteria to which these considerations lead are themselves logico-empirical in nature: that is, they judge the theory to which they are applied on its possession of certain logico-empirical features. In the formulations typically given by philosophers of science, the logico-empirical features which are prized in theories include internal logical consistency, consistency with existing well-corroborated theory, consistency with known data, the ability to generate novel predictions, and as high a degree of simplicity as is attainable.[7]

However, logico-empirical criteria are not sufficient to determine the outcome of theory-choices in all circumstances. For instance, there are presumed to be cases in which the choice among competing theories is underdetermined by the application of logico-empirical evaluative criteria. Such criteria would be insufficient to adjudicate among two or more competing theories which exhibited the same predictive power over all possible evidence but possessed some incompatibility (e.g., radically different ontological commitments) which prevented their being considered alternative expressions of a common theoretical substructure.[8]

This underdetermination of theory-choice might be averted by making recourse to a set of evaluative criteria separate from and additional to the logico-empirical criteria, in the hope that the joint application of the two sets of evaluative criteria will decide between pairs of theories awarded equal merit on logico-empirical grounds.[9] Those scientists and philosophers who have explored this course to prevent underdetermination have often turned to aesthetic criteria as the source of the second or supplementary evaluative canon. For example, F. Rohrlich claims that Einstein's general theory of relativity would on aesthetic grounds be deemed superior to alternative theories which demonstrate equal logico-empirical virtues:

> There is . . . great beauty in a physical theory. . . . It is that beauty which affects the credibility of one theory over another in the absence of more stringent criteria. For instance, the general theory of relativity is so beautiful that it is preferred over rival theories as long as those rival theories cannot account any better for the empirical facts.[10]

If aesthetic criteria are to act as tie-breakers when theory-choice is underdetermined by the community's set of logico-empirical evaluative criteria, as Rohrlich proposes, they cannot themselves be logico-empirical criteria: they

must be directed at evaluating the degree to which theories possess some specified extra-empirical features. In applying logico-empirical criteria, a scientist evaluates a theory's proximity to the truth, or at least its likely degree of observational success; in applying aesthetic criteria, the scientist must be evaluating his or her theories for other than their proximity to the truth or likely observational success. Returning to the speculations in aesthetics outlined in the previous section, it is natural to conclude in a preliminary way that, while scientists' evaluation of theories on logico-empirical criteria corresponds to the search for utilitarian, practical or 'scientific' virtues, their aesthetic evaluation of those same theories is 'disinterested', in paying no heed to the likely empirical performance of the objects of the evaluation.

Before commenting further on the identification of these categories, however, it is best to review some historical evidence for the proposition that scientists, when subjecting a theory to an aesthetic evaluation, indeed consider themselves to be judging it for something other than its likely observational performance.

4. THE DISJUNCTION OF SCIENTISTS' AESTHETIC AND EMPIRICAL EVALUATIONS

Scientists appear to believe that a theory's score on an aesthetic evaluation is independent from its score on logico-empirical criteria.[11] For example, in writing that 'Einstein's theory [of general relativity] has the very highest degree of aesthetic merit: every lover of the beautiful must wish it to be true',[12] H. A. Lorentz implicitly acknowledges that the theory of relativity may be beautiful and yet not true, that it may satisfy one of the classes of evaluative requirements but not the other. In this belief he is joined by E. Rutherford, writing in 1932: 'The theory of relativity by Einstein, quite apart from any question of its validity, cannot but be regarded as a magnificent work of art',[13] he endorsed the idea that the aesthetic virtues of Einstein's theory were a matter separate from that of its empirical validity.

The most convincing evidence that the outcomes of scientists' aesthetic evaluations of their theories pay no heed to the likely observational success which they will achieve is offered by cases in which a scientist's aesthetic and empirical assessments of a theory have diverged. Such a separation appeared in physicists' reactions to quantum electrodynamics, a quantum-mechanical theory developed in the 1940s.

From soon after its formulation, quantum electrodynamics numbered among the empirically most successful modern accounts of a body of experimental data: it attributes values to such physical quantities as the Lamb shift and the anomalous magnetic moment of the electron which agree with measurement within the bounds of experimental accuracy, which amounts to a few parts per million. However, the theory yields these outstanding predictive results only after certain infinities, which during calculations appear in the values attributed to the electron mass and charge, are excised by a mathemat-

ical procedure developed by J. Schwinger, R. P. Feynman and others, and named 'finite renormalization'.[14]

Because of the need to apply renormalization during any use of the theory, quantum electrodynamics struck and continues to strike many physicists as aesthetically displeasing: P. A. M. Dirac was among those who objected to it on these grounds.[15] He manifested no reservation about its ability to account for experimental data; his scepticism was concerned entirely with what he considered to be the unacceptable inelegance of the manipulation necessary to draw from it determinate predictions. He expressly noted in quantum electrodynamics the cohabitation of empirical power and aesthetic shortcomings, and directed his repeated criticism exclusively to the latter features of the theory. He wrote in a formulation typical of his concerns: 'Recent work by Lamb, Schwinger, Feynman and others has been very successful . . . but the resulting theory is an ugly and incomplete one, and cannot be considered as a satisfactory solution of the problem of the electron.'[16] Dirac here demonstrates that a scientist may ascribe to a theory a high score in a logico-empirical evaluation, but a low score in an aesthetic assessment. If his aesthetic judgement of the theory were directed at ascertaining its likely predictive performance, it would scarcely differ so widely from his opinion of it on logico-empirical criteria. This hints that something of Dirac's stance in his aesthetic assessment of quantum electrodynamics may be captured by the statement that it embodies a lack of interest in the empirical virtues of the theory.

The historical record contains also a class of instances in which theories judged aesthetically pleasing have simultaneously been recognized as empirically inadequate. E. Schrödinger has aesthetic praise but empirical criticism for the Lamarckian theory of evolution: he writes that it is 'beautiful, elating, encouraging and invigorating', but adds, 'Unhappily Lamarckism is untenable. The fundamental assumption on which it rests, namely, that acquired properties can be inherited, is wrong'.[17] The same disjunction is asserted more recently by D. Sciama in commenting on the cosmological steady-state theory of F. Hoyle and others: 'It is very beautiful but it is now in serious conflict with observation'.[18]

Each such instance lends weight to the proposition that scientists hold the outcome of their aesthetic evaluation of theories not to depend upon their empirical judgements of them. J. Rosen generalizes from the observation that a theory with less aesthetic appeal than another may exhibit superior empirical virtues:

> If we eavesdrop on private discussions among scientists, we might hear expressions such as, 'This is a beautiful theory (of ours)!' or, 'His theory is rather ugly.' Both theories might be equally good, in that they both explain the same natural phenomena equally well. In fact, the 'ugly' theory might even be better.[19]

If the possibility exists that the 'ugly' or aesthetically less pleasing theory is

empirically 'better' than the 'beautiful' one, it must be that the evaluation of the theory on empirical grounds is not systematically correlated with its evaluation on aesthetic grounds. If the aesthetic evaluation is independent of the empirical one, it must be that the procedure of assessing theories aesthetically is carried out with no regard for the empirical or predictive utility which application of the theory would afford. Rosen's is thus a further voice in support of the thesis that the aesthetic evaluations which scientists perform of their theories are carried out in an attitude of utilitarian disinterestedness.

The component of scientific practice which is revealed in these statements appears eminently suited to an application of the aesthetic theory of Bullough. As section 2 described, Bullough acknowledges that much evaluation of objects of perception is concerned to rank them according to the practical or utilitarian advantage which they afford to the percipient. Scientists' theories are doubtless evaluated in this spirit when they are subjected to experimental test: after all, the purpose of such tests is to ascertain the empirical adequacy of theories, and thereby the degree to which they are likely to reveal themselves useful in future applications. But Bullough suggests that one may adopt an aesthetic evaluative stance, different from the utilitarian one, by disregarding the utilitarian interests which one might have in the object of perception. This act is precisely the one which scientists perform in turning an aesthetic evaluative eye upon their theories: this is how for instance Sciama can say that the steady-state theory is at once beautiful and in conflict with observation. The latter judgement is the outcome of an empirical or utilitarian evaluation, and captures Sciama's expectation that the theory will afford cosmologists little predictive advantage in applications to come. This unfavourable empirical evaluation however does not preclude Sciama's simultaneously feeling that the theory has aesthetic merits, revealed to him through a judgement which abstracts from the utilitarian dimension of the theory.

5. SHAFTESBURY AND HUTCHESON ON THE AESTHETIC QUALITIES OF THEORIES

The suggestion that the theories of science are commonly subjected not only to utilitarian assessments aiming at determining their likely empirical worth, but also to disinterested evaluations on aesthetic criteria, can be found in the eighteenth-century originators of the theory of the aesthetic attitude.

The idea that a disinterested perceptual attitude may be applied to scientific theories surfaces when Shaftesbury turns from considering the perception of beauty in nature to the aesthetic delight afforded by contemplation of theorems in mathematics:

> There is no one who, by the least progress in science or learning, has come to know barely the principles of mathematics, but has found, that in the exercise of his mind on the discoveries he there makes . . . he receives a pleasure and delight superior to that of sense. When we have thoroughly searched into the nature of this contemplative delight, we shall find it of a kind which relates not in the least to any

> private interest of the creature, nor has for its object any self-good or advantage of the private system.[20]

Shaftesbury here maintains that there exist two modes of attention which are commonly directed upon the products of mathematical reasoning. One relates to the interests which the percipient may hold in the use of a theorem or theory; the other, which Shaftesbury is concerned to distinguish from the former, yields a 'contemplative delight' which is wholly disjoint from prospects of utilitarian advantage. Shaftesbury's follower F. Hutcheson distinguishes the aesthetic contemplation of scientific knowledge from an awareness of the scientific or empirical utility which its application affords:

> It is easy to see how men are charmed with the beauty of such knowledge, besides its usefulness. . . . And this pleasure we enjoy even when we have no prospect of obtaining any other advantage from such manner of deduction than the immediate pleasure of contemplating the beauty.[21]

Shaftesbury's and Hutcheson's remarks on mathematics and science accord with the idea that scientific theories are subjected to assessment on two separate evaluative canons, one concerned with the empirical worth of the theory as evinced by its application in prediction, and the other concerned in an aesthetically disinterested fashion with the purely perceptual qualities of the theory.[22]

As evidence for the thesis that our aesthetic judgements of objects of perception are uncorrelated to our assessments about the objects' likely practical use to us, Hutcheson adduces the frequent human practice of sacrificing utilitarian virtues in the search for sensations of beauty: he asks, 'Do not we often see convenience and use neglected to obtain beauty, without any other prospect of advantage in the beautiful form than the suggesting the pleasant ideas of beauty?'[23] This question might well be posed in scientific practice too. If theories are susceptible to evaluation on two uncorrelated evaluative canons, as we have seen, it is possible for the verdict delivered in a case of theory-choice by the application of one canon to conflict with that of the other; in a practical instance, in which a decision were required between two competing theories, such a conflict might result in one theory's being recommended for adoption by the aesthetic canon, and the other's being accorded preference by the empirical canon. If a scientist resolved to 'see convenience and use neglected to obtain beauty', he or she might be led to opt for the theory which appeared to exhibit the superior aesthetic virtues, even if its competitor appeared empirically superior by dint, say, of its predictive record. This stance corresponds precisely to that taken by Dirac towards quantum electrodynamics, and reported in the previous section: Dirac paid tribute to the empirical virtues of the theory, but was led none the less to resist it on the grounds of his dissatisfaction with it on extra-empirical, aesthetic grounds.

6. CONCLUSIONS

It is cogent and fruitful to view scientists' aesthetic evaluations of their theories as an exercise of a mode of disinterested attention. This hunch establishes communications between two previously separate bodies of speculation: the debate on the merits of theories of the aesthetic attitude, and investigations of scientists' practice of evaluating scientific theories on aesthetic grounds. Each body is strengthened by its new links. The aesthetic theory of Bullough gains reference to a domain in which the disinterested mode of attention appears to operate; in fact, the theory of the disinterested attitude may model scientists' practice of aesthetic evaluation of their theories more accurately than it does the evaluation of art works. For its part, speculation on the nature of scientists' aesthetic evaluations gains an elaborate and distinguished corpus of aesthetic theory which demonstrates prima facie applicability and which may be able to offer guidance for further philosophical investigation of this aspect of scientific practice.

The extension of the theory of the aesthetic attitude to scientific practice may hold one additional point of interest for aesthetic theory. The application of aesthetic categories to intellectual constructs is considerably less familiar to work in aesthetics today than it was at the time of Shaftesbury and Hutcheson. H. Osborne laments this decline, which he attributes to changes in the concerns of the philosophical community rather than to any lack of value of the notion:

> Nowadays the concept of intellectual beauty is not, I believe, commonly repudiated as much as neglected; few of the standard works on aesthetics pay more than lip-service to it and I know of none which has either attempted a deep analysis or given to it equal weight with sensory beauties in the framing of general aesthetic concepts.[24]

As recent work in the philosophy of science shows, the notion of intellectual beauty is alive and under constant application in science: aesthetic factors play a distinctive part in shaping scientific practice, for instance in helping to determine the evaluations which communities pass on theories. The remedy to the neglect identified by Osborne may therefore fittingly pass through the study of the intellectual categories applied by scientists to their theories. Such a study might best be undertaken on the working assumptions that the aesthetic evaluative judgements passed in scientific practice are at least frequently disinterested, and that therefore this component of scientific practice might support an application of the theory which holds aesthetic perception to be the exercise of a disinterested mode of attention.

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[1] See e.g., H. Osborne, 'Mathematical beauty and physical science', in *British Journal of Aesthetics* 24 (1984), pp. 291–300, and 'Interpretation in science and in art', in *British Journal of Aesthetics* 26 (1986), pp. 3–15; J. W. McAllister, 'Truth and beauty in scientific reason', in *Synthese* 78 (1989), pp. 25–51; G. Engler, 'Aesthetics in science and in art', in *British Journal of Aesthetics* 30 (1990), pp. 24–34.

[2] E. Vivas terms the mode of attention which is characterized by purposelessness as 'intransitive', in that the act terminates upon the object of attention without referring to some entity exterior to that object. See his *Creation and Discovery: Essays in Criticism and Aesthetics* (New York: The Noonday Press, 1955), pp. 93–9.

[3] E. Bullough, '"Psychical distance" as a factor in art and an aesthetic principle', in *British Journal of Psychology* 5 (1912), pp. 87–118. For treatments of 'aesthetic disinterestedness' sympathetic to Bullough, see J. Stolnitz, *Aesthetics and Philosophy of Art Criticism* (Boston, Mass.: Houghton Mifflin, 1960), pp. 34–5, and H. Khatchadourian, *The Concept of Art* (New York U.P., 1971), pp. 164–73.

[4] Bullough, '"Psychical distance" as a factor in art and an aesthetic principle', op. cit., p. 118.

[5] For criticism of Bullough's theory of disinterested attention see G. Dickie, *Art and the Aesthetic: An Institutional Analysis* (Ithaca, New York: Cornell U.P., 1974), pp. 91–112, and K. Price, 'The truth about psychical distance', in *Journal of Aesthetics and Art Criticism* 35 (1977), pp. 411–23.

[6] I discuss some other possible aesthetic features of theories in my 'Truth and beauty in scientific reason', op. cit., pp. 30–6.

[7] For a discussion of logico-empirical evaluative criteria, see e.g. W. H. Newton-Smith, *The Rationality of Science* (London: Routledge and Kegan Paul, 1981), pp. 226–32.

[8] For a further discussion of underdetermination see W. H. Newton-Smith, 'The underdetermination of theory by data', in *Proceedings of the Aristotelian Society*, Supplementary Volume 52 (1978), pp. 71–91.

[9] Newton-Smith examines and appraises this strategy for overcoming the underdetermination of theory-choice, ibid., pp. 76–7.

[10] F. Rohrlich, *From Paradox to Reality: Our Basic Concepts of the Physical World* (Cambridge U.P., 1987), pp. 13–14.

[11] I recognize that care must be exercised in the interpretation of scientists' methodological accounts. For discussion of the problems involved in this, see S. W. Woolgar, 'Writing an intellectual history of scientific development: the use of discovery accounts', in *Social Studies of Science* 6 (1976), pp. 395–422, and N. Gilbert and M. Mulkay, 'Experiments are the key: participants' histories and historians' histories of science', in *Isis* 75 (1984), pp. 105–25.

[12] H. A. Lorentz, *The Einstein Theory of Relativity: A Concise Statement* (New York: Brentano; third edition, 1920), p. 23.

[13] Quoted in D. Wilson, *Rutherford: Simple Genius* (London: Hodder and Stoughton, 1983), p. 432; for further details of the context of this remark see ibid., p. 594.

[14] Accounts of the development of quantum electrodynamics, of the introduction of the renormalization procedure and of its empirical successes are given by S. Weinberg, 'The search for unity: notes for a history of quantum field theory', in *Daedalus* 106 (1977), no. 4, pp. 17–35, esp. pp. 21–30; S. Aramaki, 'Formation of the renormalization theory in quantum electrodynamics', in *Historia Scientiarum* 32 (1987), pp. 1–42; and J. Schwinger, 'A path to quantum electrodynamics', in *Physics Today* 42 (1989), no. 2, pp. 42–8.

[15] Further on Dirac's ideas on the use of aesthetic evaluative criteria, see my 'Dirac and the aesthetic evaluation of theories', in *Methodology and Science* 23 (1990), pp. 87–102.

[16] P. A. M. Dirac, 'A new classical theory of electrons', in *Proceedings of the Royal Society of London*, Series A, 209 (1951), pp. 291–6; quotation at p. 291. S. Shanmugadhasan tells of an episode in which Dirac issued a similar judgement of the theory: he writes that in 1945 Dirac 'emphasized that he did not believe his quantum electrodynamics was the right theory because it was so complicated and ugly'. See Shanmugadhasan, 'Dirac as research supervisor and other remembrances', in *Tributes to Paul Dirac*, ed. by J. G. Taylor (Bristol: Adam Hilger, 1987), pp. 48–57; quotation at p. 53.

[17] E. Schrödinger, *Mind and Matter* (Cambridge U.P., 1958), pp. 21–2.

[18] Quoted in Osborne, 'Interpretation in science and in art', op. cit., p. 12. A similar phrase is attributed to Sciama by R. Kippenhahn: 'The steady-state theory has a sweep and beauty that for some unaccountable reason the architect of the universe appears to have overlooked'. See Kippenhahn, *Light From the Depths of Time*, translated by S. Dunlop (Berlin: Springer-Verlag, 1987; original publication 1984), p. 153. The import of these statements is identical: the steady-state theory's failure to be instantiated in the universe is revealed by a predictive inadequacy which is quite independent of its aesthetic virtue.

[19] J. Rosen, *Symmetry Discovered: Concepts and Applications in Nature and Science* (Cambridge U.P., 1975), pp. 120–1.

[20] Shaftesbury (A. A. Cooper, Third Earl of), *Characteristics of Men, Manners, Opinions, Times etc.*, edited by J. M. Robertson (Two volumes. London: Grant Richards, 1900; original publication 1711), vol. I, p. 296. On Shaftesbury's notion of disinterestedness and its ethical forebears see J. Stolnitz, 'On the significance of Lord Shaftesbury in modern aesthetic theory', in *Philosophical Quarterly* 11 (1961), pp. 97–113, and 'On the origins of "aesthetic disinterestedness"', in *Journal of Aesthetics and Art Criticism* 20 (1961), pp. 131–43. On the relation between ethical and aesthetic values in Shaftesbury see J. A. Bernstein, *Shaftesbury, Rousseau, and Kant: An Introduction to the Conflict between Aesthetic and Moral Values in Modern Thought* (London: Associated University Press, 1980), pp. 21–60. Further on Shaftesbury's aesthetics in general see R. L. Brett, *The Third Earl of Shaftesbury: A Study in Eighteenth-Century Literary Theory* (London: Hutchinson, 1951), pp. 123–44.

[21] F. Hutcheson, *An Inquiry Concerning Beauty, Order, Harmony, Design*, edited by P. Kivy (The Hague: Martinus Nijhoff, 1973; original publication 1725), p. 51.

[22] On the later developments of the notion of aesthetic disinterestedness in eighteenth-century British philosophy see Stolnitz, 'On the origins of "aesthetic disinterestedness"', op. cit., pp. 134–9. On disinterestedness and attitude in Kant's aesthetics see H. Osborne, *Aesthetics and Art Theory: An Historical Introduction* (London: Longmans, 1968), pp. 113–30, and M. A. McCloskey, *Kant's Aesthetic* (London: Macmillan, 1987), pp. 29–49.

[23] Hutcheson, *An Inquiry Concerning Beauty, Order, Harmony, Design*, op. cit., p. 37.

[24] H. Osborne, 'Notes on the aesthetics of chess and the concept of intellectual beauty', in *British Journal of Aesthetics* 4 (1964), pp. 160–3; quotation at p. 160.