# The question of style in philosophy and the arts

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CAMBRIDGE
UNIVERSITY PRESS

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# Introduction

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## THE NEED FOR STYLE

Why do philosophers concern themselves with questions of style? Moreover, why should they bring together a volume of essays dealing with matters as seemingly diverse as Heinrich von Kleist's *Marionettentheater*, Hogarth's graphical work, the writings of Tocqueville, the use of ellipses in Kepler's astronomical theories, and eclecticism in eighteenth-century English architecture? The answer is a short one: to get clarity about their daily work.

Philosophers can no longer consider the question of style a mere artistic or literary question. Style has transgressed the boundaries of art and aesthetics, and has invaded philosophical fields such as metaphysics, the philosophy of science, political philosophy, and ethics. One of the consequences of what could be called postmodern pluralism in philosophy is that philosophy as a whole – whether it accepts a postmodern stance or opposes it – has grown more conscious of the importance of its medium, which is generally the written text, and as a consequence of its own hidden aesthetics.

This awareness is most often prompted by philosophers who, like Nietzsche and Wittgenstein, write in a distinctive, more or less literary style, and who, moreover, attach a particular importance to style in philosophical thinking, knowledge, or life in general. But even those philosophies that deny having a dependence on style, seeing themselves as conducting a methodical search for truth, cannot be exempted from stylistic analysis. In the first essay of this volume, Berel Lang makes clear why the question of style is inescapable, even for those philosophical writings that profess to be style-less. In fact, Lang writes, philosophy's silence about the literary character of its writings is part of a more general effort to repress its

own historicity. Method aims at excluding what style embodies: method is supposed to lead anyone who follows its rules to the same results, whereas style is essentially personal and historically rooted. Nevertheless, even such methodically rigorous writings as Descartes' and Kant's exhibit style-related features, of which the contrast between style and method itself is not the least important. The contrast between method and style, Lang writes, has become part of the representation of philosophy, and thereby of its meaning; philosophy's disregard of its own expressive features and its emphasis on methodological rigour has itself become an expressive feature of philosophy. As Lang says, 'In this sense, style gives method a voice that method by itself would not have or even allow for'.

It is therefore not surprising that many philosophers are suspicious of the recent concern for philosophy's styles: what is at stake is the self-image of their discipline. They fear a trivialisation of philosophy, in which the rigorous reflection on time-honoured questions about the true, the good, and the beautiful is reduced to the rhetoric efficacy of advertising strategies. Indeed, the growing awareness of the stylistics of philosophy could lead to cynicism: for instance, when the hidden rhetorical strategies of a text are shown to be in opposition to the overtly proclaimed argumentation, as when Plato, in the *Gorgias*, sets out to demonstrate the futility of rhetoric, but, in doing so, does not shrink from employing all the rhetorical devices he professes to despise.

But there is more to style than that. The philosophy of style could tell us that the emperor we so earnestly believed in has in fact always been naked. But it could also show the other side of that story: the capacity we have to visualise those non-existent clothes. Even if we saw through philosophy's tricks, and discovered how it tries to convince us of imperial robes that actually consist of thin air, we could marvel at its capacity to stimulate our imagination and to give form to a hitherto unthought aspect of the world. Even if a philosophical text fails to give us certainty about the world, it can give us new and fruitful ways to think about it. Not only by what it sets forth through its explicit argumentation, but also by what it shows: by what it makes us see through its imagery, by what it makes us feel through its tone, by the way the text constructs its world for us through the selection and arrangement of its material. Call it the *je ne sais quoi* of good philosophy, that makes the difference between a book we merely use in our research, and a book

we continue to cherish after our theses are written. That is, in short, what good philosophy makes us discover through its style.

The question of style presents itself not only when we read other philosophers, but also – most forcefully – when we ask ourselves how we should write. There is the problem of the method, or approach, or tradition, and the concomitant style we choose to work in – style here in the sense of 'general style'. Do we choose an analytical, a dialectical, or a phenomenological approach? Do we opt for hermeneutics, semiotics, or deconstruction? Or do we combine several of these, and if so, how do we do that? We seem to have too many options. And it is difficult to compare them in a neutral, rational way. What one considers relevant depends on the approach one has chosen; and the particular approach one chooses, depends on what one finds relevant. Our choice, therefore, is not wholly justifiable from a neutral, third-person stance. It will have something to do with who we are or want to be: with our style in the sense of 'personal style'.

And our choice will also have to do with our sense of our subject-matter. How do we want to present it, so that we not only define it, analyse it, compare it, but also bring it alive? What happens to our subject matter after we have dealt with it? Do we still recognise it, or have we irrevocably changed its appearance? Are we still able to tell our readers, not only what its component parts are, which muscles and bones and nerves we find under its skin, but also why it fascinated us in the first place? What we communicate about our subject depends on the form of our writing: 'form' not as an external and arbitrary mould we use for a given content, but as the way we discover and construct that content for ourselves and our readers. This is also very much a question of style. Style might be the place where our sense of our subject-matter and our sense of ourselves as philosophers meet.

With respect to the analytical power of the notion of style, philosophers can learn from musicians, painters, architects, and writers, and from the theorists and historians of their practices. We can learn how styles work, how they are formed and transformed, from those fields where style has been a major issue long before philosophy discovered its significance. Richard Wollheim's essay, for instance, offers many categories, distinctions and insights on pictorial style that with some modification might be valid for philosophical style as well. Wollheim makes a persuasive case that while an individual pictorial style (such as the style of Rembrandt) has psychological reality, and reference to it may therefore have

explanatory value, there is no 'fact of the matter' to universal style (such as the style of the northern baroque). Therefore reference to the latter may have taxonomical value, but can have no explanatory power. We might ask whether the distinction between general and individual philosophical style runs along the same lines as that between general and individual pictorial style, or differs in that general style has a more substantive reality in the case of philosophy, a reality being rooted in method. In this way, comparison with the arts can help us to develop stylistic categories that are specific to philosophy, as Lang's essay proposes.

## STYLE AND PROPRIETY

The first requirement is a philosophical analysis of styles and their choice that attributes no privilege to any particular style (not even to 'scientific', 'objective', or 'representational' styles), but rather sets on an equal footing all styles that may be adopted in a practice. A possible tool is the interpretation of a style as the codification of a notion of propriety.

A feature of many human practices (perhaps of all, save the conceptually most elementary ones) is that their practitioners construct for themselves a notion of propriety. (The term 'aptness' might serve almost equally well.) The notion of propriety that a practice has stipulates, in some sense, which potential contributions to the practice should be regarded as proper or apt. It serves to validate certain contributions to the practice, and to disqualify certain other ones. A notion of propriety is particular to a certain practice, and it alters with time; moreover, especially in periods of crisis, different members of a practice may advocate competing notions of propriety. Physical science in eighteenth-century France, government in nineteenth-century Britain, painting in the Soviet Union, had each one or more distinctive notions of propriety.

In different practices, the notion of propriety assumes different forms. Depending on the nature of the practice, propriety might be identified in a methodological, epistemological, aesthetic, moral, or communicative value. 'Objectivity', which has entered into definitions of propriety in many practices, including the sciences and prose genres in literature, is a primarily epistemological notion; 'authenticity', which has entered into definitions of propriety in music and architecture, is largely an aesthetic notion; 'justice',

which has entered into definitions of propriety in political practice, is chiefly a moral notion.

Now, where is a practice's notion of propriety codified? We suggest that it should be seen as codified in a style. This suggestion coheres well with many well-entrenched turns of phrase which we use about style. In virtue of coming under the influence of a style, a practitioner becomes acquainted with the notion of propriety currently prevailing in his or her practice. In creating and proposing an unprecedented style, a practitioner offers to the community a fresh notion of propriety. A work created outside the prevailing style is seen as improper, as lacking propriety. Clearly, styles in this sense are not the styles projected as interpretative or classificatory concepts by historians into the arts of the past. Rather, they are, while probably never explicitly voiced in an art, what guides the practitioner in his or her contributions.

This explains how it is that we can usefully identify something like a style in many different practices, while they seem so unlike one another. Styles in all practices resemble one another in being codifications of notions of propriety, and they can be identified on this criterion; but the notions of propriety constructed within different practices are very different, and therefore so are styles, their codifications.

On this view of styles, it is not the case that there is for each practice a 'non-stylistic' specification of what counts as a proper contribution, and styles merely suggest different ways in which such a contribution may be made. Rather, styles stipulate what a proper contribution to the practice is. For instance, it is not the case that, in painting, there is a style-independent notion of 'representation', and that different painterly styles compete to offer such a representation; rather, these styles issue their own norms governing what 'representation' itself should be understood as.

This view lends itself to, but probably does not require, a strongly constructivist interpretation of many epistemological and other notions. According to this interpretation, the notions of the rational, the objective, the rigorous, and so on, are defined afresh in each new style which refers to them, and have no content outside particular styles.

By relating styles in this way to notions of propriety, we can identify certain questions as being worthy of consideration when analysing a given style. Which notion of propriety is codified in this style? Why did some practitioners find it necessary to originate this

notion of propriety? What is its relation with notions of propriety prevalent in other practices at the same time, or in the same practice at other times?

A phenomenon of especial interest for our concerns is the development within certain practices of notions of propriety referring to 'objectivity'. Clearly, a very effective way of commanding assent for a certain manner of doing things is to portray that manner as the 'sole possible', the 'sole true', or the 'natural' manner. Portrayed in such light, this manner ceases to be one contender among many approximately equally worthy manners, and comes to constitute the benchmark against which other manners are to be judged for their lesser degrees of 'naturalness'. So it is for the manners which constitute styles.

Portraying a style as 'objective' generally involves establishing that reality is uniquely or unusually amenable to treatment by a particular manner of representation or expression. This is an interesting rhetorical manoeuvre, since it amounts to promoting and validating a particular choice by portraying it as lying wholly beyond discretion. Reality is, so to speak, depicted as being not the sort of thing that can be depicted in a choice of ways. None the less, it is a stylistic choice. As Martha Nussbaum has written about philosophy,

> The telling, if the story is a good one, is not accidentally connected with the content of the told. And this ought to be so whether the teller is a literary artist, whom we suppose always to be conscious of the nature of stylistic choices, or a philosopher, whom we often think of as avoiding or eschewing style altogether. No stylistic choice can be presumed to be neutral – not even the choice to write in a flat or neutral style.[1]

The next step in entrenching a style as natural is, of course, to deny that its adoption poses any stylistic question at all. A particular mode of representation or expression, one hears, is not subject to styles; only the modes alternative to ours are styles; to introduce questions of style here would be to relinquish objectivity. In this line of reasoning, 'style' invariably acquires a pejorative connotation, as if it were a perturbing influence on the otherwise natural administration of business.

Therefore the greatest victories of particular styles are signalled by the widest and most enthusiastic proclamation that a practice has resisted the lure of a style. Traditionally, the practitioners of logic, mathematics, and the natural sciences have prided themselves on the avoidance of styles. These are also the disciplines in which the

rhetoric of objectivity is strongest. Clearly, these disciplines have, for a large part of their existence, been under the complete domination of a particular notion of propriety, a particular style.[2]

Members of other practices, which are more obviously subject to styles, sometimes strive to establish a notion of objectivity in reaction to the styles which they find on offer. These attempts are generally expressed as calls for the return to the primitive or unvarnished manner of doing things: the idea of styles as unnatural perturbations is reinforced by the implicit suggestion that they have grown on us in recent times. The concern for objectivity which is advocated by these reformers is, of course, just one style among many; but it is presented as the repudiation of styles.

Our analysis suggests that all styles, being a working out of a particular notion of propriety, are to be treated on an equal footing from the systematic point of view. However, of course, from the historical point of view, the realisation that one style could be an alternative to another, rather than the natural way of telling the truth, arose only from an appreciation that there were different ways of telling the truth, or even different truths. Many practices spent a period of their development during which it was thought that they were immune to styles, and had only to identify the representational mode which was appropriate for that practice. This transition occurred, at different times, in the visual arts and in philosophy. Both to understand historically the development of self-aware styles, and to appreciate the current debate on styles in philosophy, it is necessary to retrace this transition.

## STYLE AND MEANING IN THE ARTS

The term 'style' was mainly used until the end of the eighteenth century by artists and art critics, as opposed to art historians in the present day, to indicate the place of a work of art in the hierarchy of the arts. Historical paintings, for instance, used the 'grand style', corresponding to the style of epic poetry, which was considered to be the summit of literature. It was also used in contrast with the terms 'manner' and 'maniera' to describe the general characteristics of a genre or school of painters, as opposed to the personal idiosyncracies of an individual artist. It had not yet acquired the importance it was going to have after 1800, when, as this volume demonstrates, style became an integral part of the content or meaning of a work of art.

When we inquire into the causes that led to the rise of style as a major artistic factor, it is illuminating to contrast the writings of two eminent artists, one writing before and the other after 1800, on artistic standards and style. Reynolds and Schinkel serve here as examples, but there are many other possible instances. Reynolds repeatedly declares in his *Discourses* that the assiduous imitation of nature and tradition, guided by reason, is the only way of reaching perfect truth and beauty in painting:

> Nature is, and must be the fountain which alone is inexhaustible, and from which all excellencies must originally flow . . . All the inventions and thoughts of the Antients . . . are to be sought after and carefully studied; the genius that hovers over these venerable relicks, may be called the father of modern art.[3]

Whereas Schinkel, writing sixty years later, looking back on his own lifelong preoccupation with style, is not so sure:

> I observed a great vast store of forms that had already come into being, deposited in the world over many millennia of development among very different peoples. But at the same time I saw that our use of this accumulated store of often very heterogeneous objects was arbitrary . . . It became particularly clear to me that the lack of character and style from which so many new buildings seem to suffer is to be found in such arbitrariness in the use [of past forms]. It became a lifetime's task for me to gain clarity on this issue. But the more deeply I penetrated into the matter, the greater the difficulties that stood in the way of my efforts. Very soon I fell into the error of pure arbitrary abstraction, and developed the entire conception of a particular work from its most immediate trivial function and from its construction. This gave rise to something dry and rigid, and lacking in freedom, that entirely excluded two essential elements: the historical and the poetical.
>
> I pursued my researches further, but very soon found myself trapped in a great labyrinth.[4]

Nature, the classical heritage, and reason lost their status of reliable and unquestionable guides and standards for the artist. Instead, the artist was confronted with an overwhelming repertoire of forms left from the past, and at a loss to find a reliable and justifiable criterion for selecting from these. Thus bereft, art becomes style-less and therefore meaningless: because it can no longer evoke the tradition to which it should belong, it lacks the power to speak to the beholder. Although Schinkel's use of the term 'style' still echoes Reynolds' definition – 'Style in painting is the same as in writing the power over materials, whether words or colours, by which conceptions or sentiments are conveyed'[5] – in his stress on the instrumental role of style in conveying the meaning of a work of art, he does not

share Reynolds' serene confidence in nature and the past. Instead, he tries to find new foundations. Prefiguring the splendours and misery of Modernist architecture, he tries to find a guide for design in the function and construction of a building, but without success: the result was not architecture, we might say, but mere building, without freedom or meaning. In other words, concentrating on structure and content is not sufficient to create meaningful architecture, when the traditional standards for its design and interpretation are no longer there. Something else is needed, which Schinkel, and many others with him, call 'style'.

Style thereby takes over the role of nature, the past, or reason as the provider of meaning. That is, an aspect of writing, painting, or building traditionally associated with ornament or presentation, that could be varied without changing the content, gradually becomes the principal bearer of meaning of the work of art. This can perhaps be demonstrated most clearly in architecture, where the selection of a historical style, unrelated to structural or functional matters, becomes the vehicle for the meaning of the building. One example is steel and glass architecture, which, because of its rejection of the use of historical styles, was called meaningless and therefore denied the status of architecture.[6]

The growth of the importance and scope of style in the arts is traced in the contributions of Mary Lindberg, Joe Mordaunt Crook, and Caroline van Eck. Lindberg shows how style is invested with a new role in Hogarth's satirical work: from being a technique for the selection of the appropriate idiom, it becomes a *strategy*, that is, a purposive method for conveying meaning and persuading the spectators of his work, by making use of the associations connected with several theatrical and operatic genres and their formal devices. Lindberg examines in detail in what way Hogarth borrowed devices from the theatre and from satirical fiction, such as conventions for stage-setting, acting or story-telling, and incorporated them into his own prints. She thus brings fresh insights to the study of the interrelatedness of the arts based on the doctrine of *ut pictura poesis*, which in the case of the links between theatre and painting has until now received very little critical attention.

The essays of Mordaunt Crook and van Eck throw light on the evolution from stylistic device to style from a different angle. Van Eck shows the rhetorical origins of the concept of style when it was introduced in French architectural theory around 1750. There it performed the role of a unifying concept, regulating the choice and

use of ornament in order to enhance the emotional effect of the building on the spectator. By taking into account the rhetorical background of the notion of style, new light is thrown on the breakdown of Vitruvianism at the end of the eighteenth century. She then discusses the way style acquired a wider meaning in the writings of Quatremère de Quincy, where it became the expression of the age, country or material of a given period, thereby prefiguring nineteenth-century notions of style. Her essay thus illuminates the development of the meaning of the concept of style in architectural theory in a new way, by taking into account the hitherto neglected role of rhetoric, and shows why the nineteenth-century quest for a style of its own was bound to fail because of its inherent contradictions.

Mordaunt Crook shows the historical origins of what he terms the 'dilemma of style': the rise, as the consequence of the disintegration of the classical tradition in the second half of the eighteenth century, of a situation in which architects were faced with a choice between several styles. This dilemma was the result of the combination of the Renaissance notion of an individual style and of Romantic Picturesque aesthetics, which gave birth to the notion of a multiplicity of styles. Thereby style was transformed from the expression of structure into a pictorial allusion which would act on the memory and imagination of the spectator. This development resulted in the theory of architectural association, which stressed the individual nature of beauty, and rejected objective standards. Thus Associationalist aesthetics contributed to the displacement of Classicism as the universal style. Mordaunt Crook then traces the development resulting from the Picturesque choice of styles on Associationalist grounds to the conflict in the early nineteenth century between the Neo-Gothic and Neo-Classicism, which he presents as the triumph of the Picturesque. It led to a stylistic jungle later on in the nineteenth century, to which Modernism momentarily put an end. But with the rise of Postmodernism, the dilemma, based on our desire for ornament, semiotic codes, or images of structural processes, has returned.

As we have sketched above, style becomes the focal point for the artist's search for meaning, after the loss of belief in the absolute standards of reason, nature, and antiquity which occurred around 1800. Before 1800, there was hardly a question of there being a possible choice among styles: contributions to a practice were regarded not as belonging to one style or another, but rather as

falling within or being alien to the practice. For instance, in architecture, buildings that did not conform to the Classical style (as we would say), such as Gothic buildings, were regarded as falling outside the scope of architecture.[7] Rather than a distinction between different architectural styles, there was merely a distinction between architecture and non-architecture.

In our view, the development from stylistic monism to stylistic pluralism in artistic theory and the arts can be seen as foreshadowing the present concern of philosophy with style.

## STYLE IN PHILOSOPHY

The deepening erosion of objective standards in the arts, as exemplified in architecture, and the arts' growing self-awareness as style-bound, invested philosophy too, with a time-lag of about a century. From the late sixteenth century onwards, western philosophical writing incorporated standards of propriety and efficacy about which there was no debate. These standards were based in part on mathematical and geometrical forms of reasoning, that were credited with the power of leading infallibly to truth. Philosophical method, as exemplified in Descartes' *Discours de la méthode*, in Spinoza's *Ethics*, or in Kant's *Prolegomena*, took the analytical rigour, conceptual clarity, and absolute standards of truth of mathematics as its model. Writings which did not embody this model, while apparently philosophical to present-day eyes, such as Pascal's *Pensées* or the fragment of Kleist's that Dorothea Franck reproduces, were in their time considered as literature rather than philosophy or science.

In the twentieth century, we have relaxed both the criteria for what counts as effective manners of reasoning in philosophy and correspondingly the range of works that we are prepared to see as philosophical. In place of a distinction between philosophy and non-philosophy, there is now a portfolio of philosophical styles. Both Nietzsche and Wittgenstein contributed to the erosion of this monolithicity by their critique of the absolutist pretensions of traditional metaphysics and of the supposed transparency of method. Simultaneously, their writings exemplify the stylistic diversity of what became acceptable in philosophy. In their work, the notion of style, which originated in rhetoric, with its focus on persuasion rather than proof, probability rather than truth, ornament rather than content, and more generally on the process of writing

rather than on the body of truth revealed in the philosopher's writing, becomes the point on which the concern for meaning and truth focuses.

The approach of philosophers such as these is examined in this volume by Lambert Wiesing and Salim Kemal. Wiesing sees in their work a '*Stil statt Wahrheit* programme': they tend to substitute style for truth.

Wiesing explores the parallels between the stance of Ludwig Wittgenstein in philosophy and of Kurt Schwitters in art. Each was trained in a discipline in which the traditional goal was truth, but in which confidence that truth could be attained had in the early part of the twentieth century been shaken. Each reacted to this state by setting out a view of his discipline in which truth was replaced as a goal by style. Schwitters, whose reflections originated in artistic practice, found in style the sole admissible principle of orientation for artistic work. For him, works of art had no meaning but only style. For instance, he regarded his poetry as 'sound painting', in which words are used as expressive but meaningless material of composition. Schwitters thus rejected two of the images of art that were most influential during his lifetime. On the one hand, he regarded as an illusion the conventional view of artworks as bearers of meaning and portrayers of the truth; on the other, he resisted the dadaists' anguish at the apparent lack of any principle of orientation in the arts. The intermediate line that Schwitters traced posited that, while this principle of orientation could not be truth, it could and had to be style.

Wiesing sees in Wittgenstein a similar response to his age. Wittgenstein writes that the behaviour of persons is determined not so much by the content of dogmas as by images, especially images of themselves. Moreover, the effect of such images is more subtle than any effect that dogmas could ever have: pictures do not issue injunctions, but rather offer to the agent forms of expression. In his more radical writings, Wittgenstein interprets even the question of the validity of propositions as a matter of style. So Schwitters and Wittgenstein saw style discharging the roles that had formerly been attributed in art and philosophy to the ideal of truth.

Kemal argues that Nietzsche's concept of will, understood as the stylistically guided creation of values, can be reconciled with a progressive idea of community. He does so by showing that Nietzschean genealogy does not necessarily lead to nihilistic consequences. Though genealogy considers values to be interpreta-

tions, issuing from particular standpoints, the threat of solipsism can be surmounted if one stresses the space it allows for the creation of new values. Those styles are marked as healthy, strong or full that make possible the generation of new interpretations and the creative interaction between the producers of values. Therefore the pursuit of style can engender a viable and progressive community of creators.

Now that we have been alerted to the existence of this diversity of philosophical styles, we can turn a fresh gaze onto the history of pre-nineteenth-century philosophy, and reinterpret even those philosophers who prided themselves on the objectivity of their method in stylistic terms. We can now detect stylistic devices in all philosophical writing, however remote in time, however apparently straightforward. Some stylistic devices are evidently chosen with a persuasive effect in mind, such as the dialogue form.[8] As Lang's essay shows, Plato's dialogue form implies an individual role for the reader and – like a poem or play – does not allow for generalising conclusions without obscuring other, more central features of the text. But even the apparently more neutral treatise styles must be the fruit of stylistic choice. Descartes and Kant, writers who are usually considered to address their readers in a straightforward manner, use different stylistic devices. Descartes' implied readers have to do something beyond their reading: they have themselves to practise the method described by Descartes and to come to its conclusions individually. With Kant however, reading the description of the method is itself its application.

The conscious introduction of stylistic devices as an argumentative strategy into philosophical discourse is exemplified by the writings of Tocqueville on democracy, which are discussed in the essay by Frank Ankersmit. In Tocqueville's analysis, democracy is a subject-matter that lends itself to being treated in only certain ways by historians and political theorists. Unlike the despotic political systems that preceded it, democracy is not an entity about which one could lay out an objective and detached theory using familiar scholarly language. In Tocqueville's time, historiographic language was heavily metaphorical. Metaphors order reality by identifying essences and creating centres. But Tocqueville saw democracy as lacking essences and centres. The language most suitable to depict the network of interrelations between people and their democratic rulers was, in Tocqueville's view, not metaphorical, but paradoxical. As Ankersmit shows, verbal paradoxes cause us to mistrust utterances and direct our attention back to the object of discussion.

When the object of discussion is unsusceptible to well-worn utterances, as was democracy, this stylistic strategy alone enables us to grasp its nature.

Even the practice of the natural sciences, which up to the Renaissance were classed as branches of philosophy, shows stylistic aspects. Branches of science traverse periods in which theorising is dominated by a particular style. The task for historians and philosophers of science is to proceed beyond recognising styles of theorising in the historical record, and provide some account of how these styles become entrenched in scientific practice. James McAllister's essay defends the suggestion that scientists attribute weight to stylistic features of theories in recognition of the empirical performance of past theories that have embodied those features. Lest this utilitarian connection be regarded as foreign to the notion of style, McAllister portrays well-known episodes in the formation of styles in the applied arts as exhibiting similar aspects. For instance, in architecture, the design possibilities offered by new materials of construction have won favour within stylistic canons only once the utilitarian advantages of the new materials have become apparent. The parallels between the manner in which styles become entrenched in the sciences and in the applied arts hint at a unity underlying phenomena of style in different practices.

## USES AND LIMITS OF STYLE

Looking backwards, we cannot but acknowledge that philosophical propriety might be encoded in more than one way. But what does this recognition of philosophical pluralism entail for the philosophy-to-be? The task of the stylistically informed philosopher is a precarious one. To use the potential of style to its greatest philosophical advantage, one has on the one hand to do without the certainties of style-less and objective truth, and on the other to avoid the nihilism that pluralism might lead into. This task in many ways resembles that of the artist, who, in the midst of a proliferation of styles, has to find his or her own way of working.

Some of the possibilities and the dangers of a philosophy that is aware of its style are traced in the three essays that conclude this volume. Nicholas Davey's essay focuses on a question that was also commented upon by Kemal's essay: how to save philosophy, now that it is aware of its inherent stylistic character, from collapsing into indifference. He attacks the presuppositions of the deconstructive

strategy that aims at reducing meaning to 'mere' stylistics. Deconstruction may be right in challenging metaphysical notions of meaning-in-itself, but what it cannot challenge is a dimension of philosophical awareness that cannot be put into words and that prevents philosophy's reduction to the rhetorical. This dimension lies in the revelatory experience of meaningfulness that happens for instance in the sudden understanding of what somebody is 'getting at'. Only if we re-learn to trust this experience of meaningfulness whenever this occurs, Davey writes, will we be able to 'climb over the stile of being merely mannered' and find our own individual styles.

Davey tries to find a middle ground, in between traditional philosophical claims on certainty of meaning and deconstructivist denials of its possibility. The construction of this 'in between' is also a central concern in Charles Altieri's search for a dynamic conception of intentionality, in which both the quest for individual fulfilment and the ethical responsibility towards others are conceived in terms of a personal style. He tries to shed light on those aspects of subjective agency that are 'too fluid and too resistant to concepts to be easily handled by traditional models of desire and judgment, or to be easily demystified into the equation of subjectivity with subjection now dominating literary criticism'. He especially focuses on the notion of responsibility, which can be understood neither in terms of how we respond, nor be deduced from third-person understandings about categorical imperatives. Responsibility depends on 'how we represent actions so as to involve consequences in our relations to future selves and to other persons'. Our personal style might be conceived of as the making visible of the boundary conditions allowing our engaging in those relations: 'Style maps a will onto a world'.

Davey's and Altieri's essays focus on a dimension of reflective awareness that hovers between determinacy and indeterminacy. The fragility of this awareness and its articulation is brought out with poetical lucidity in Franck's essay. Franck attempts to illuminate the elusive notion of style from a new angle: from its aspects of innocence (lost or regained), self-consciousness and gracefulness. She takes as a starting-point Heinrich von Kleist's essay on the theatre of marionettes, which is printed here as an appendix to her essay. Her paper charts the risks and difficulties of tracing the way style can be understood by calling in such concepts as grace and innocence without losing the sense of the topic or without letting

slip the separation between what we say and the act of saying it. As Franck points out, 'when we state that a strict borderline between art and the discourse *about* art can no longer be drawn, our own discourse might become infected by this confusion, without, however, automatically becoming art'. By using Schleiermacher's notion of divination (instead of interpretation) as the appropriate mode of understanding style, and Wittgenstein's ethical criterion of truthfulness rather than truth, she illuminates the change in the role and meaning of style in contemporary philosophy.

As this volume shows, style has always been with us, though not always acknowledged. By bringing together essays on style in the arts and in philosophy in one volume, we show that the relation between philosophy and the arts is not only one of the arts being influenced by philosophy. On the contrary, these essays show that developments in recent philosophy that are intimately related to style can be made intelligible by looking at the way the concept of style functioned and developed in the arts. In both fields, we can observe that when a crisis occurs, and practitioners start to look around for new foundations and certainties, the scientific or philosophical criteria of truth and the rigour of method are abandoned in favour of an approach that is closer to the rhetorical attention to strategies for formulating insights. Then the philosopher or artist has the task of selecting the stylistic devices apt to captivate and move the audience, rather than searching for the inescapable objective representation. This represents not a loss, but an opportunity.

NOTES

1 M. Nussbaum, 'Fictions of the Soul', *Philosophy and Literature* 7 (1983), pp. 145–6.

2 Among the studies of science as a rhetorical practice, see J. A. Schuster and R. Yeo eds., *The Politics and Rhetoric of Scientific Method: Historical Studies* (Dordrecht: Reidel, 1986); A. G. Gross, *The Rhetoric of Science* (Cambridge, Mass.: Harvard University Press, 1990); P. Dear ed., *The Literary Structure of Scientific Argument: Historical Studies* (Philadelphia: University of Pennsylvania Press, 1991); and M. Pera and W. R. Shea eds., *Persuading Science: The Art of Scientific Rhetoric* (Canton, Mass.: Science History Publications, 1991).

3 Sir Joshua Reynolds, *Discourses*. Edited with an introduction and notes

by P. Rogers (Harmondsworth: Penguin Books, 1992), *Discourse VI* (1776), pp. 160 and 166.

4 C. F. Schinkel, *Architektonisches Lehrbuch*, ed. K. Peschken (Berlin: Akademie Verlag, 1979), p. 150, quoted and translated by A. Potts, 'Schinkel's Architectural Theory', pp. 48–9, in M. Snodin, ed., *Karl Friedrich Schinkel: A Universal Man* (New Haven and London: Yale University Press, 1991).

5 Reynolds, *Discourse II*, p. 96.

6 See for example *The Ecclesiologist* 12 (1851), p. 269.

7 See also E. S. De Beer, 'Gothic: Origin and Diffusion of the Term', *Journal of the Warburg and Courtauld Institutes* 11 (1948), pp. 143–62; see p. 156.

8 On the dialogue form in science and philosophy, see G. Myers, 'Fictions for Facts: The Form and Authority of the Scientific Dialogue', *History of Science* 30 (1992), pp. 221–47.

9

# The formation of styles: science and the applied arts

JAMES W. MCALLISTER

## STYLE AND REVOLUTION IN SCIENCE

On traditional models of scientific practice, whenever there arise two or more incompatible theories purporting to explain the same domain of phenomena, scientists choose one from amongst them by applying criteria of empirical adequacy. These criteria attribute value to empirical virtues of theories, such as their predictive accuracy and scope, their ability to generate novel predictions, and the degree of their simplicity.

Certainly, this model of theory-choice is still capable of accounting for very many notable episodes in the history of the sciences. However, the realisation has grown that, in order to achieve even better agreement with the historical record, the belief that scientists decide choices among theories by examining their empirical qualities needs to be supplemented by reference to extra-empirical, and particularly to aesthetic, criteria which scientists use. There is now little doubt that scientific communities choose among available theories not only for their empirical performance, but in part also on the application of aesthetic criteria of assessment.[1] It appears that these evaluations are guided by what may be considered 'stylistic canons', often holding across an entire scientific community, in which given aesthetic features of theories are attributed positive values. Examples of such features are the form of a theory's simplicity (such as 'ontological parsimony', or 'arithmetical simplicity'), its symmetry properties, and its susceptibility to particular analogical interpretations (such as by mechanistic analogies).[2]

The following is a model of the mechanism by which these aesthetic or stylistic canons are constructed and revised.[3] On this

model, the mechanism is inductive. A community constructs its stylistic canon at a certain date from among the aesthetic features of all past theories by attributing to each feature a weighting proportional to the degree of empirical success scored up to that date by the theories which have embodied that feature. (The degree of empirical success scored by theories is, of course, judged by the application of the community's empirical criteria of theory-evaluation.) The collection of aesthetic features and weightings thus assembled forms the community's stylistic canon.

For an illustration of this mechanism, imagine the following scenario. A scientific community looks back over the recent history of a particular branch of its physical science. It perceives that several of its past theories, which have been empirically very successful, exhibited ontological parsimony to notable degree; and that certain other past theories which it had entertained, which supported mechanistic analogies, scored on the contrary little empirical success. Both 'ontological parsimony' and 'tractability by mechanistic analogies' are, on this model, aesthetic qualities of theories. In consequence of the empirical success of the ontologically parsimonious theories, ontological parsimony will obtain an increased weighting in the aesthetic canon of theory-evaluation which the community will hereafter apply in the relevant science. On the other hand, the property of being tractable by mechanistic analogies will receive a lowered weighting in the canon, in virtue of the scarce empirical success of recent theories which displayed this property.

Of several implications of this inductive mechanism, two are worthy of note here.

Firstly, the mechanism ensures that stylistic canons in science are conservative: they will tend to attribute greater value to, and to recommend for adoption, theories which are stylistically similar to past theories, in duplicating the aesthetic features embodied by the empirically more successful theories of the recent past. This phenomenon can be described by saying that scientific activity traverses periods in which a certain style is dominant.[4] For instance, successive theories in the principal physical sciences from the end of the seventeenth century onwards showed a unifying 'Newtonian style': they exhibited (among other aesthetic features) the form of simplicity embodied in Newton's theory of gravitation, in seeking to resolve all problems into the effect of radial forces.[5]

Secondly, while the inductive process is of itself continuous, in the sense that under its operation any change in the composition of a

stylistic canon is achieved continuously or gradually, it is easy to envisage situations which might prompt the discontinuous substitution of one stylistic canon by another in the community. Consider the following two cases.

Continuous development of a stylistic canon will be obtained while the canon's rate of evolution roughly maintains pace with the evolution of the aesthetic features exhibited by the sequence of theories which come to be embraced by the community. This is the situation in which theories embodying new features appear infrequently enough, or demonstrate their empirical power gradually enough, that the stylistic canon is able to reshape itself so as to come to value highly the particular aesthetic features which the theories exhibit. In this situation, in other words, the stylistic canon is able to renew itself as fast as the style of successive empirically successful theories changes.

If, on the other hand, the aesthetic features of the theories progressively adopted by the community evolve too fast, the community's aesthetic evaluative canon will no longer be able to renew itself sufficiently quickly to reflect those changes. The canon will lag behind developments, continuing to attach the greatest weight to aesthetic features which were exhibited by the community's former best theories, but which are not shown by the current best theories. In these circumstances, in order to remove conflict in theory-choice, some members of the community will see no alternative but to suspend their allegiance to the established aesthetic canon, and to conduct theory-choice on empirical criteria alone.

An illustration both of the inherent conservatism of aesthetic canons, and of a decision by the progressive members of a community to suspend allegiance to aesthetic commitments, is offered by the early history of quantum physics. The decision to formulate non-deterministic theories of atomic phenomena was taken by several scientists in the early decades of the twentieth century in order to solve empirical problems which were defeating the resources of classical physical theory. However, conservative scientists like M. Planck and A. Einstein soon came to oppose the new quantum mechanics, on grounds which are most accurately described as aesthetic and metaphysical: Einstein opposed the theory not because of any empirical deficiency of it, but because he felt it depicted a universe lacking harmony and beauty. More progressive colleagues of his, most notably N. Bohr, chose on the

contrary to abandon the commitments they may have had to aesthetic preferences entrenched by exposure to classical physics, and embraced quantum mechanics in virtue of its empirical successes.

By this route one reaches an interpretation of the notion of 'scientific revolution', as a suspension of a community's aesthetic evaluative canon (after which a fresh aesthetic canon is of course formed by the postrevolutionary community, through the renewed operation of the inductive mechanism already described). There are several well-known transitions in the history of science which on this model are interpreted as revolutions. For example, the preference for interpreting the planets' path as circular was deeply entrenched in Ptolemaic and Copernican astronomical theory up to the seventeenth century. It prompted initial resistance to J. Kepler's theory, which attributed to the planets elliptical rather than circular orbits. However, Kepler's theory gradually demonstrated its predictive superiority, contributing to the overthrow of the previously long-held aesthetic and metaphysical commitments, and leading to the formation of a new canon of theory-assessment in planetary astronomy. Because of the discontinuous change in the community's aesthetic evaluative canon which this episode witnessed, it counts on the present scheme as a revolution.[6]

While this model of theory-assessment enjoys good accord with data on several episodes in the history of science, the suggestion that the canons of theory-assessment constructed by the inductive mechanism are indeed aesthetic canons, rather than canons of some other sort, has attracted some scepticism. In response, this chapter seeks to support the idea that aesthetic evaluative canons may be constructed in scientific practice by roughly the mechanism described above. This aim will be pursued by pointing out that aesthetic or stylistic canons are in some of the applied arts constructed by a similar sort of mechanism. It will be argued that the similarities between the manner of formation of styles in science and of styles in the applied arts are sufficiently striking for us to conclude that the same processes underlie both phenomena, and hence that the evaluative canons in science discussed above are as 'aesthetic' as those in art.

The following treatment of some episodes of the history of architecture and other applied arts draws on the idea that, roughly speaking, a certain new material or technique of construction can foster the establishment of a new aesthetic or stylistic canon, once

resistance grounded on pre-existing stylistic canons has been overcome. (For present purposes, a known material used for the first time in a new activity or context counts as 'a new material'.)

## THE ARCHITECTURAL USE OF CAST IRON

Before 1750, cast iron had been used very little in construction in Britain, chiefly in railings, fire-backs, and other decorative and domestic fittings, rather than in structural roles. The greatest familiarity with the material had been gained not by architects schooled in aesthetics, but by engineers trained in the technical aspects of foundry. Because of this, the first structural uses of cast iron in building were prompted primarily by non-architects, and motivated by practical rather than aesthetic concerns.[7]

One of the building sectors in which practical concerns were most prominent was the construction of bridges. Masonry was still the customary material for bridges towards the end of the eighteenth century, but ironmasters and engineers began then to suggest that cast iron be used, partly in the effort to obtain long spans. The ironmaster J. Wilkinson recommended the use of iron when plans were drawn up to bridge the River Severn at Coalbrookdale in Shropshire, the county at the centre of pioneering work in iron casting: his efforts resulted in 1779 in the world's first cast-iron bridge, by the ironmaster A. Darby.[8] The civil engineer T. Telford, who was county surveyor to Shropshire, built no fewer than five iron bridges in the county. The first of these, over the River Severn at Buildwas (1796), was of particular importance, since it contained notable improvements over the design of the Coalbrookdale bridge, thanks to which it achieved greater economy in its use of iron. Another engineer, J. Rennie, erected several iron bridges, including one over the River Witham at Boston, Lincolnshire (1803), and the Southwark Bridge over the Thames in London (1819). The tradition whereby the design and construction of bridges in cast iron fell to civil engineers rather than architects was carried forth by I. K. Brunel, among others. By his time, iron bridge-building was firmly established in France as well as in Britain.

Another practical concern which prompted the recourse to iron in building was fireproofing. Fire was a great concern in the eighteenth century wherever people assembled in large numbers either for work, as in factories and warehouses, or for entertainment, as in theatres. Textile mills in both Britain and France traditionally had

internal structures of heavy timber beams and columns. Since they were lit by naked flames, and the machinery which they housed used inflammable lubricants, they were very vulnerable to fire. In the last years of the eighteenth century, several mills burned down with great losses, and it became imperative for mill owners to find ways of making their buildings incombustible. Cast-iron-framed mills were developed largely in response to this need. Their designers were primarily not architects but, as were the designers of the early iron bridges, engineers: often the same engineers who were simultaneously using cast iron in developing jennies and looms of new designs and the steam engines which would power them. The engineer W. Strutt and R. Arkwright, the inventor of the spinning jenny, erected a six-storey cotton mill at Derby in 1792–3 which had iron columns (though still retained timber beams, protected by plaster sheathing) and was described as fireproof. The engineers who perfected rotary-motion steam-engines, M. Boulton and J. Watt, constructed a much-imitated seven-storey cotton mill in Salford in 1801 which employed not only cast-iron columns but also I-section cast-iron girders to carry the floors.[9]

These applications of iron by engineers allowed the new material to demonstrate its potential in solving structural problems in building, and encouraged architects to contemplate exploiting it. However, the early uses of iron by architects reveal misgivings about the material's aesthetic acceptability which the engineers had not felt.

Where engineers used iron to solve what they regarded primarily as engineering problems, they tended to be unconscious of or to ignore architectural styles or mannerisms evolved for use with previous materials: it was this insulation which helped them to produce the remarkable examples of original design embodied for instance in the early iron bridges. However, largely because of professional demarcations, the designs of bridges and industrial buildings produced by engineers were not considered to enter the scope of architectural-aesthetic concerns. It is not of course that these structures had no style, merely that their style went unrecognised as such. By contrast, the work of members of the architectural profession fell – virtually by definition – within the scope of aesthetic canons. Because of this, the architects who first came to use iron in structural roles often felt the need to be 'architectural'. In their eyes, this meant continuing to apply prevailing aesthetic guidelines, despite the fact that these had been evolved before the

arrival onto the architectural scene of iron structures and drew their justification from the aesthetic potentialities of pre-existing and familiar materials, such as masonry. Architects could not prevent engineers from designing whatever structures they chose outside the architectural domain, but intended that within their domain the established canons should be retained.

The architects' established styles frequently led them to conceal any iron structures which they or engineers had designed behind claddings and trimmings in some traditional material, and shaped in some traditional style. Among the earliest architect-designed buildings which incorporate cast iron in structural roles is H. Labrouste's Bibliothèque Ste-Geneviève in Paris (1843–50).[10] The graceful vaulting of the library's reading-room could have been achieved only through the use of slender iron columns and arches: to this extent, the form of the building is determined by the new material. The iron-frame structure is visible within the reading-room; however, the library has a facade of masonry in a generally conventional Neo-Renaissance design, which completely hides the internal iron frame from public view.

The same lack of aesthetic conviction is apparent in several mid-eighteenth-century railway stations in Britain. The design of stations was often the outcome of collaboration between architects and engineers, and sometimes the resulting edifices reflect an uneasy compromise between the professions. For instance, in St Pancras Station in London (1864), the engineer W. H. Barlow erected a cast-iron train-shed of which the elegant pointed arch had the widest span ever achieved; but this was entirely concealed from the approach to the station by the massive Gothic head-building in traditional masonry designed by Sir George Gilbert Scott.[11] The aesthetic ambivalence of this kind of marriage has been illuminated by J. Gloag's remark that in the mid-nineteenth century in Britain engineers saw themselves as 'putters-up of structures', while architects were 'putters-on of styles'.[12]

Clearly by this time it had not yet been accepted by many architects that iron, for all its technical advantages, was worthy of aesthetic acceptance as a material for public display. Some still tried to confine the use of iron to 'utilitarian', 'non-architectural' buildings. As late as 1863, the influential German architect G. Semper was declaring that while iron was a suitable material for railway stations, in view of their impermanent nature, stone was the only true material for monumental art, including libraries.[13]

Gradually, however, some critics began to call for the open and visible use of iron in buildings of all categories. In the 1860s, E. E. Viollet-le-Duc retraced the failings of many current architectural projects to a lack of authenticity, deriving from the fact that the forms actually imposed on buildings were not those most appropriate to the materials or techniques of construction employed:

> We construct public buildings which lack style, because we attempt to ally forms bequeathed by certain traditions to requirements which no longer bear relation to those traditions. Naval architects and mechanical engineers do not, when building a steamship or a locomotive, seek to recall the forms of sailing-ships of the time of Louis XIV or of harnessed stage-coaches. They obey unquestioningly the new principles which are given them and produce works which have their own character and their proper style.[14]

Viollet-le-Duc demands two things: that any materials of construction used in a building should appear openly, not hidden by cladding, and that structures should follow the stylistic principles most suited to their materials, rather than mimic forms appropriate to other ages. If cast iron is used in the frame of a building, for example, firstly it ought to remain visible from the exterior, and not clothed in masonry or stucco, and secondly the style impressed on the entire building should be the one which permits the fullest exploitation of the technical capabilities of iron.

By the end of the nineteenth century, Viollet-le-Duc's call for authenticity was answered within his profession, and architects felt able to use cast iron openly in public buildings. A particularly influential demonstration of the uses of iron was given in two buildings erected for the Paris Universal Exhibition of 1889.[15]

In the Galerie des Machines, by the engineer V. Contamin and the architect F. Dutert, which was an exhibition pavilion boasting a span of over one hundred metres (demolished in 1910), iron and the forms appropriate to its use were not so much displayed as flaunted. The building's gross structure was constituted by a number of trusses or arches, each made up of two symmetric halves, which touched at a point along the centre-line of the roof. Each truss thinned noticeably towards the ground, unlike stone or masonry columns, which generally taper upwards. This building's design embodied distinctive architectural-aesthetic principles, permitted by the characteristics of iron, and not seen in buildings designed with earlier materials in mind: for instance, the separation between beam and column had vanished, so that it was no longer possible to

distinguish between load and support. The effect of the gallery was described by C. Schädlich:

> All the aesthetic ideas associated with stone buildings have been turned on their head in one instant. With the point-like bearing surfaces for the great masses, the seemingly floating vaulting, and the transparency of the whole construction, in similar fashion to the related station halls, new aesthetic laws are postulated which, understandably, not all observers readily accept as a legitimate architectural medium. The architecture lives by its own laws of completely integrated and visibly composed iron design.[16]

In this building, in short, no style had been applied to the structure, other than the one which arose naturally from the structure's material.

The second notable building erected for the 1889 exhibition was, of course, the three-hundred metre iron tower by G. Eiffel. At first, this was commonly considered a hideous monster. Even before its completion, the Artists' Protest of 1887, instigated by C. Garnier, the architect of the Paris Opera House, and signed by the writers G. de Maupassant and E. Zola among others, requested that the tower not be retained beyond the close of the exhibition, on the grounds of its ugliness.

In the face of this criticism, the commonplace early defence of the tower was to enumerate its utilitarian justifications, such as the benefits it offered for communications and scientific research (in physics and meteorology, for instance). This manner of justifying iron structures, hinging entirely on their utilitarian advantages, virtually concedes the aesthetic ground to the conservatives, as if it were too much to argue that a structure like the Eiffel Tower could ever be considered beautiful. Soon, however, iron buildings began to acquire also an aesthetic defence, in virtue of the fact that the architectural aesthetic had begun to be remoulded by the forms characteristic of the new material. Thanks to this evolution of aesthetic canons, the Eiffel Tower outgrew its perception as a monster, acquiring in time the status of modern icon.[17]

By the end of the nineteenth century, cast iron (and later its structurally similar replacement, steel) was admitted into the vernacular of civic architecture. This evolution threw into the shadow some of the materials which had earlier dominated architectural style. According to J. K. Huysmans, for instance, the contrast with iron made stone appear 'played out, exhausted by its repeated use' in the buildings erected for the 1889 Paris exhibition.

'It could only produce better disguised or more skilfully linked borrowings from old forms.'[18]

The design innovations prompted by cast iron made their appearance at different times in different countries. For instance, Vienna came to know the iron structures pioneered in such centres as London and Paris only late in the nineteenth century and in a tamer form. Designing the stations of the Vienna city railway system in 1894–1901, O. Wagner allowed iron beams and arches to emerge to the exterior, but he remained under the spell of the traditional impulse to architectural beautification, which led him to incorporate such features into quasi-Baroque stone facades.[19]

In the gradual introduction and acceptance into architecture of cast iron, three partially overlapping phases may be discerned. In the first, iron was still foreign to architectural work. Engineers progressively demonstrated its utilitarian advantages by employing it in structures outside the commonly accepted scope of the architectural aesthetic, such as bridges and industrial buildings. In the second phase, architects began to exploit iron for its utilitarian attributes; however, the pre-existing stylistic canons in architecture – centred upon the use of masonry – still forbade the new material a place in aesthetic constructions, and architects felt the continuing need to conform to these canons by concealing iron structures behind more conventional claddings.

In the third phase, towards the end of the nineteenth century, misgivings at the lack of authenticity involved in this masking prompted more open uses of iron; gradually, the material began to reshape architects' stylistic canons. The opinion grew in strength that architectural canons ought no longer to hinder the exploitation of iron: whereas in the earlier stages the manner of using iron would have bowed to the requirements of architectural canons, it was increasingly felt that from then on the architectural canons ought to reflect the usefulness of iron. As the German critic A. Gurlitt wrote in 1899: 'The question . . . is not how to mould iron to make it conform to our taste, but the much more important one, how to mould our taste to make it conform with iron?'[20] It was in consequence of this appreciation that iron structures began to be regarded as susceptible of holding aesthetic value. When this stage became established, architects working in iron were no longer imposing alien styles onto iron structures, but allowing the structures to find the styles most appropriate to them.

## THE INTRODUCTION OF REINFORCED CONCRETE IN ARCHITECTURE

The stages through which cast iron gradually established itself in architecture as a material with not only utilitarian benefits but also aesthetic dignity were traversed also, with a lag of a few decades, by reinforced concrete.[21]

During the twentieth century, concrete came to be appreciated as a material offering the possibility of architectural forms self-evidently different from those of brick, stone, or iron. Its plasticity allows it to assume any curve or other shape in which moulds can be constructed, and its monolithicity permits traditional separations between different building elements, such as wall and roof, to be superseded. But the earliest types of concrete were seen merely as synthetic stone, apt to mimic at lower cost the effects typical of the long-established techniques of masonry construction. Stuccoed rubble, treated to simulate masonry, was used in France as early as the reign of Louis XVI by architects attempting to recreate the splendour of mansions of former times for fashionable but impoverished clients. As long as concrete was used in no other guise, the architectural principles which governed the practice of construction in masonry could easily be applied to it.

Concrete grew better appreciated in Britain in the 1870s, when it became habitual to cite to its advantage two qualities, alongside its low cost: that it was 'sanitary' (or hygienic) and 'fireproof'. The first quality was valued especially in workers' dwellings, and the second – once again – in public and industrial buildings. In France, following some destructive fires in the textile district around Roubaix and Tourcoing in the 1890s, the great pioneer F. Hennebique built a number of concrete spinning mills. The possibility of filling structural concrete frames with nothing but sheets of glass permitted the fulfilment of a further requirement, the provision of adequate light in multi-storey factory blocks. In short, the qualities of concrete were found to meet some utilitarian needs of the new industrial society.

Initially, discussions among architects and engineers about the use of concrete were confined to its technical aspects, as if the problem of finding pleasing and appropriate forms did not arise for such a utilitarian material; but as its use grew more widespread, it became apparent that the chief remaining obstacle to its full acceptance as an architectural medium lay in the difficulties of giving it an appro-

priate appearance. The usual tendency, reminiscent of the habit of cladding cast-iron structures which was then gradually being discontinued, was to follow tradition in imposing upon any visible concrete surfaces either a cladding in some other material, or a finish which mimicked stone.

The ambivalence of architects torn between the exploitation of concrete for its utilitarian advantages and the concealment of the material for its aesthetic unacceptability is illustrated by one of the landmark buildings in concrete in California. The Leland Stanford Junior Museum of Stanford University was designed by E. L. Ransome in 1889–91 to have the entire wall and floor in concrete. On the one hand, this is probably the earliest building in which concrete is left exposed, rather than being regarded as a cheap infilling or backing to which a fair surface had subsequently to be applied. On the other hand, the concrete surface is deliberately tooled to imitate masonry, to complement the building's traditional design and classical colonnade.

The approach of concrete towards full architectural acceptance was promoted by architects and critics who, much like Viollet-le-Duc on behalf of cast iron, urged acknowledgment that the characteristics of a new material ought to be allowed to dictate the manner of its own ornament and presentation, rather than being constricted into the idiom of some other material. The concern for authenticity surfaced for instance in 1901 in the comments of the critic P. Forthuny on a concrete building, designed by E. Arnaud and incorporating both offices and apartments, which had been erected in Paris three years earlier. Arnaud had feared public disapproval of a bare concrete facade, and had therefore faced his building with cement rendering of conventional form. Forthuny regrets this act as missing an opportunity to help develop an aesthetic appropriate to concrete:

> Reinforced concrete is a new material, and has no links with the systems of construction which preceded it; it must thus necessarily draw from within itself its exterior aspects, which must be clearly differentiated from familiar modellings in wood, marble or stone. How can one innovate lines and surface modellings in domestic architecture which are in some way the consequence of the use of reinforced concrete? . . . M. Arnaud has doubtless not dared to risk such an undertaking . . . How much more edifying his façade would have been had he just made the effort to adorn it in its own way, extracting from the study of his material the elements of an entirely personal decoration of his own design.[22]

Once again, the stage of development of a new material had been reached in which authenticity was perceived to demand its open use, and the exploration of the aesthetic implications of such use.

Reinforced concrete achieved its aesthetic maturity perhaps in the work of the French architect A. Perret, whose career shows an increasingly undisguised use of concrete.[23] One of his earlier works is the well-known apartment block at 25b, Rue Franklin, in Paris (1903). The skeleton of this building is entirely in concrete, and consists of columns, beams, and slabs, which have the advantage of removing from the plan of the apartments any load-bearing walls. But the facade appears as yet unwilling to acknowledge the material which dictates the building's form, and is clad in ceramic tiles. Before long, however, Perret came to reject such ornamental veneers, and displayed the concrete frames of his buildings undisguised. He did this first in buildings such as the Admiralty Research Laboratories, on Boulevard Victor, in Paris (1928): these are simple rectangular buildings with blank walls in which the structural elements were displayed openly. While architectural innovations might be dismissed as lacking aesthetic implications in buildings of such utilitarian functions as laboratories for technical research, Perret soon extended the use of bare concrete to buildings with greater aesthetic pretensions. The deepest architectural acceptance of a new material is perhaps signalled when it comes to be used visibly in religious buildings: Perret's Notre Dame du Raincy (1922) exhibited columns and vaulted slabs of concrete framing large expanses of glazed non-load-bearing walls.

Even at this advanced date, many architectural critics objected to Perret's design, maintaining that, in a church, concrete ought to be confined to vaulting and be covered by a decorative veneer, since its appearance was insufficiently noble for the building's liturgical functions. None the less, concrete had by that moment generally attained architectural acceptance in virtue of its aesthetic potentialities as well as of its utilitarian advantages. From then, one could begin to speak literally of the aesthetic of reinforced concrete, meaning by that expression the aesthetic canon which sprang in this way from the architectural use of the material.[24]

The stages outlined for cast iron and reinforced concrete could be retraced for many other materials, such as aluminium and plate glass, as well as for many construction techniques. Almost every building material and technique has undergone a kind of aesthetic apprenticeship, moving from the fringes of architectural activity to

its centre, initially on the strength of its utilitarian applicability, until it had reshaped architectural taste and expectations so as to carve out a place for itself in the prevailing aesthetic canons.[25]

## MATERIALS AND FORMS IN INDUSTRIAL DESIGN

The aesthetic apprenticeship served by materials in architecture is perceptible also in other applied arts, such as industrial design.[26] There too, new materials are first used to mimic styles established by their more familiar predecessors. This mimicry is often essential in the manufacture of consumer goods, which would fail to appeal to aesthetically conservative householders if clothed in styles considered too futuristic or iconoclastic. Only gradually do manufacturers allow their designers to communicate to their products those new forms permitted by the new material; and then only gradually do some of these forms win acceptance among consumers. Eventually, of course, the consumers may come to expect such objects to have no appearance other than the one made familiar by the new material.

An example of this cycle is provided by the bent steel which became available for household goods in the second half of the nineteenth century. Early designs for furniture using this material tended to imitate traditional wood-inspired styles, and few designers took steel as a prompt to develop new forms. It was only with the advent of tubular-steel structures in the 1920s that furniture design began to respond to the new aesthetic possibilities offered by the material.[27] Similarly, plastics, which began to appear in consumer goods after the First World War, were initially seen only as an economical substitute material to be used in such articles as buttons, buckles, and combs; these objects in plastic tended to mimic the forms and appearance of their predecessors in the traditional and more expensive wood, horn, or ivory. Only in the 1930s did the aesthetic possibilities of moulded plastics begin to be explored, in such objects as portable radios, after which the new visual images offered by plastics grew to command their own aesthetic credit.

When manufacturers give a new material, in its early phases, traditional forms, neglecting to pursue its distinguishing aesthetic possibilities, they reassure the aesthetically conservative public, but often horrify progressive designers and critics, who may see in this a kind of duplicity bordering on betrayal. One such is N. Pevsner, who lists some of his dislikes:

> In a cardboard travelling-case made to imitate alligator skin, in a bakelite hair-brush made to imitate enamel – there is something dishonest. A pressed-glass bowl trying to look like crystal, a machine-made coal-scuttle trying to look hand-beaten, machine-made mouldings on furniture, a tricky device to make an electric fire look like a flickering coke fire, a metal bedstead masquerading as wood – all that is immoral.[28]

The forms imposed on each of these articles seemingly deny its new materials or techniques of manufacture, and mimic those most apt for a past material or technique.

## THE INDUCTION TO STYLES

The above accounts of the emergence of styles appropriate to new materials in architecture and in industrial design echo the model of the formation of aesthetic canons in science that I outlined at the beginning of this chapter. These echoes can be made sharper, by choosing similar language in which to describe developments in the two domains. This is attempted in the following couple of paragraphs.

The model of theory-evaluation that I outlined at the beginning of this chapter pays regard to the evolution of three factors affecting the community's judgement: the empirical power of each theory within the sequence of theories embraced by the community, the aesthetic features displayed by those theories, and the community's aesthetic evaluative canon. The empirical power of a theory adds weight to that theory's particular aesthetic features within the community's aesthetic evaluative canon; in turn, this canon is used to pass aesthetic judgements on future theories. An entrenched aesthetic canon will cause the community to produce and esteem aesthetically orthodox theories. Sometimes a theory emerges which, perhaps in consequence of pursuing new approaches or techniques, shows unprecedented aesthetic features. Such a theory is likely at first to be resisted within the community, in virtue of the community's established aesthetic canon. When and only when this theory, or others similar to it, has shown sufficient empirical success (especially if its success cannot seem to be emulated by theories of more orthodox aesthetic form), its own aesthetic features gain weight within the evaluative canon. This allows the new theory to win aesthetic as well as empirical acceptance. The revision of the evaluative canon ensures that credit will more likely be extended to

future theories which embody the new aesthetic features, enabling the community to pursue further the approach or technique which gave rise to the new style.

Similarly, the above accounts of the origin of aesthetic canons in architecture refer to the evolution of the following three factors: the perceived utilitarian worth of past buildings, their architectural-aesthetic features, and a community's architectural or stylistic canon. The utilitarian worth of a past building adds to the weight attributed in the community's stylistic canon to the stylistic elements which that building exhibits; in turn, the canon is used both to guide and to assess the design of future buildings. A well-entrenched aesthetic canon will cause the community to design and esteem aesthetically orthodox buildings. This orthodoxy of design will be maintained even in the early stages of the exploitation of a new architectural material. When a building showing aesthetic features made possible by and appropriate to the new material is erected, it is at first resisted within the community in virtue of the established aesthetic canon. When and only when this building, or others stylistically similar to it, shows sufficient utilitarian worth (especially if its practical applications cannot apparently be matched by buildings of more orthodox aesthetic form), do its own aesthetic features gain weight within the evaluative canon, allowing buildings in the new style to win acceptance on aesthetic as well as utilitarian grounds. The revision of the evaluative canon ensures that credit will more likely be extended to future buildings which embody the new stylistic features, enabling architects to exploit further the material or technique which gave rise to the new style.

In both domains, then, the demonstrated empirical or utilitarian worth of a work (the predictive power of a theory in science, the utilitarian applicability of a building in architecture) is capable of reshaping the stylistic canons by which new creations (further theories in science, further buildings in architecture) are evaluated and by which the line of progress of the discipline is partly determined.

In this light, the same stages of innovation and conservatism can be identified in the two domains. Copernicus' theory has within early-modern planetary astronomy the position occupied by a masonry building within mid-nineteenth-century architecture, before the exploitation of concrete had begun: both creations fully accord with the well-established, if soon-to-decline, stylistic canons

in their field. The early versions of quantum mechanics, which still won the approval of Planck and Einstein, occupy within the twentieth-century revolution in physics a position analogous to that of Labrouste's Bibliothèque Ste-Geneviève in the rise of cast-iron architecture: both works contain elements of profound innovation, but retain enough of the appearance of a long-established style to appeal to the conservative critics who would soon part company with the new trends.

These interpretations of the rise of stylistic or aesthetic canons in science and in the applied arts prompt a couple of closing reflections.

Firstly, the fact that certain evaluative canons used by scientists originate in procedures isomorphic to those of the formation of stylistic canons in the applied arts supports the idea that those scientific canons are indeed aesthetic, rather than being evaluative canons of some other nature. Here is therefore some evidence that scientific communities subject their creations to an aesthetic judgement, alongside the logico-empirical evaluations whose operation is almost universally recognised.

Secondly, some further light is shed on the relationship between at least some of the sciences and some of the arts. The contention of this chapter is that the procedures in which certain aesthetic or stylistic canons arise in sciences and in arts are identical, in that they are both inductive. There is therefore scope here for genuine generalisation over the two domains, perhaps via the hypotheses that these procedures are the manifestation of the same psychological tendency to value forms which have become associated with utilitarian worth, or of the same mechanisms of stylistic habituation in creative communities.

## NOTES

1 For some historical support of this claim, see H. Osborne, 'Mathematical Beauty and Physical Science', *British Journal of Aesthetics* 24 (1984), pp. 291–300; G. Engler, 'Aesthetics in Science and in Art', *British Journal of Aesthetics* 30 (1990), pp. 24–34; and J. W. McAllister, 'Dirac and the Aesthetic Evaluation of Theories', *Methodology and Science* 23 (1990), pp. 87–102.

2 For a discussion of the special problems posed by the evaluative criteria of simplicity, see J. W. McAllister, 'The Simplicity of Theories: Its Degree

and Form', *Journal for General Philosophy of Science* 22 (1991), pp. 1–14.

3 For details and further illustrations of this inductive model, see J. W. McAllister, 'Truth and Beauty in Scientific Reason', *Synthese* 78 (1989), pp. 25–51, especially pp. 36–41.

4 These styles are reminiscent of, but not identical to, the 'paradigms' discussed by T. S. Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962; 2nd edn., 1970), pp. 43–51. A survey of some issues involved in speaking about styles in science is A. Wessely, 'Transposing "Style" from the History of Art to the History of Science', *Science in Context* 4 (1991), pp. 265–78.

5 On the 'Newtonian style', see I. B. Cohen, *The Newtonian Revolution, with Illustrations of the Transformation of Scientific Ideas* (Cambridge University Press, 1980), pp. 52–154. Elements of several other styles of scientific work are identified in A. C. Crombie, 'Designed in the Mind: Western Visions of Science, Nature and Humankind', *History of Science* 26 (1988), pp. 1–12, and in Crombie, *Styles of Scientific Thinking in the European Tradition*, 3 vols. (London: Duckworth, 1994).

6 Fuller discussion of this interpretation of scientific revolutions is given in McAllister, 'Truth and Beauty in Scientific Reason', pp. 41–7.

7 On cast iron in architecture, see S. Giedion, *Space, Time and Architecture: The Growth of a New Tradition* (Cambridge, Mass.: Harvard University Press, 1941; 5th edn., 1967), pp. 163–290; J. Gloag and D. Bridgwater, *A History of Cast Iron in Architecture* (London: Allen and Unwin, 1948), pp. 53–236; N. Pevsner, *Pioneers of Modern Design: From William Morris to Walter Gropius* (Harmondsworth: Penguin Books, 1960; rev. edn., 1974), pp. 118–40; and Pevsner, *The Sources of Modern Architecture and Design* (London: Thames and Hudson, 1968), pp. 9–20, 147–9. In general on the influence of materials and techniques on architectural canons, see *The Macmillan Encyclopedia of Architecture and Technological Change*, ed. P. Guedes (London: Macmillan, 1979); R. Mark and D. P. Billington, 'Structural Imperative and the Origin of New Form', *Technology and Culture* 30 (1989), pp. 300–29; and M. Pawley, *Theory and Design in the Second Machine Age* (Oxford: Blackwell, 1990), especially pp. 69–94, 140–61.

8 On the Coalbrookdale bridge, see R. Maguire and P. Matthews, 'The Ironbridge at Coalbrookdale: A Reassessment', *Architectural Association Journal* 74 (1958), pp. 30–45, especially pp. 35–7.

9 On the early iron-framed textile mills, see A. W. Skempton and H. R. Johnson, 'The First Iron Frames', *The Architectural Review* 131 (1962), pp. 175–86.

10 On the Bibliothèque Ste-Geneviève, see N. Levine, 'The Romantic Idea of Architectural Legibility: Henri Labrouste and the Néo-Grec', in *The Architecture of the Ecole des Beaux-Arts*, ed. A. Drexler (London: Secker and Warburg, 1977), pp. 325–416, especially pp. 325–57; and Levine, 'The Book and the Building: Hugo's Theory of Architecture and

Labrouste's Bibliothèque Ste-Geneviève', in *The Beaux-Arts and Nineteenth-Century French Architecture*, ed. R. Middleton (London: Thames and Hudson, 1982), pp. 139–73, especially pp. 154–64.

11 On the critical reception of St Pancras Station, see J. Simmons, *St Pancras Station* (London: Allen and Unwin, 1968), pp. 91–108.

12 J. Gloag, *Victorian Taste: Some Social Aspects of Architecture and Industrial Design from 1820–1900* (London: A. and C. Black, 1962), p. 3.

13 W. Herrmann, *Gottfried Semper: In Search of Architecture* (Cambridge, Mass.: MIT Press, 1984), p. 179.

14 E. E. Viollet-le-Duc, *Entretiens sur l'architecture*, 2 vols. (Paris: Morel, 1863–72; facsimile edn., Paris: Pierre Mardaga, 1977), vol. I, p. 186; my translation.

15 On the buildings of the 1889 Universal Exhibition, see W. Friebe, *Buildings of the World Exhibitions*, trans. J. Vowles and P. Roper (Leipzig: Edition Leipzig, 1985; original publication, 1983), pp. 88–108.

16 Quoted from Friebe, *Buildings of the World Exhibitions*, p. 94. For more information on the Galerie des Machines, see M.-L. Crosnier-Leconte, 'La Galerie des Machines', in *1889: La Tour Eiffel et l'Exposition Universelle*, edited by the Musée d'Orsay (Paris: Editions de la Réunion des Musées Nationaux, 1989), pp. 164–95, where an account is given also of its reception, and J. W. Stamper, 'The Galerie des Machines of the 1889 Paris World's Fair', *Technology and Culture* 30 (1989), pp. 330–53.

17 On the early critical reception of the Eiffel Tower, see H. Loyrette, *Gustave Eiffel*, trans. R. and S. Gomme (New York: Rizzoli, 1985), pp. 169–89, and Loyrette, 'Images de la Tour Eiffel (1884–1914)', in *1889: La Tour Eiffel*, pp. 196–219; for testimony to the extent to which the Tower has become an icon, see R. Barthes and A. Martin, *La Tour Eiffel* (Paris: Delpire, 1964).

18 Quoted from Loyrette, *Gustave Eiffel*, p. 177.

19 C. E. Schorske, *Fin-de-Siècle Vienna: Politics and Culture* (New York: Knopf, 1980), pp. 79–81.

20 Quoted from E. H. Gombrich, 'The Logic of Vanity Fair: Alternatives to Historicism in the Study of Fashions, Style and Taste', in *The Philosophy of Karl Popper*, ed. P. A. Schilpp, 2 vols. (La Salle, Ill.: Open Court, 1974), vol. II, pp. 925–57, on p. 945. Gombrich remarks on the plasticity of taste revealed by the increasing acceptance of iron in architecture *ibid.*, pp. 945–6.

21 On the introduction of reinforced concrete in architecture, see P. Collins, *Concrete: The Vision of a New Architecture* (London: Faber and Faber, 1959); Pevsner, *Pioneers of Modern Design*, pp. 179–84; and Pevsner, *The Sources of Modern Architecture and Design*, pp. 150–5.

22 Quoted from Collins, *Concrete*, p. 70.

23 On Perret, see Collins, *Concrete*, pp. 153–287, and R. Banham, *Theory and Design in the First Machine Age* (London: Butterworth Architecture, 1960; 2nd edn., 1962), pp. 38–43.

24 A discussion of some aesthetic principles underlying the use of

reinforced concrete in architecture is P. A. Michelis, *Esthétique de l'architecture du béton armé* (Paris: Dunod, 1963).

25 On some of the personal architectural styles stimulated by new materials and techniques in the 1970s and 1980s, see C. Davis, *High Tech Architecture* (New York: Rizzoli, 1988).

26 On materials and form in industrial design, see J. Heskett, *Industrial Design* (London: Thames and Hudson, 1980), and P. Sparke, *An Introduction to Design and Culture in the Twentieth Century* (London: Allen and Unwin, 1986), especially pp. 37–55, 124–39.

27 On furniture design in the machine age, see P. Sparke, *Furniture* (London: Bell and Hyman, 1986), pp. 26–51.

28 N. Pevsner, *An Enquiry into Industrial Art in England* (Cambridge University Press, 1937), p. 11.