4. Quality in workmanship

We have given some account of workmanship. Now let us consider some of the epithets which are commonly applied to it. There are, I think, four which we should examine: 'good' and 'bad', 'precise' and 'rough'. It is usual to equate 'good' with 'precise' and 'bad' with 'rough'. To do so is false. Rough workmanship may be excellent while precise may be bad.

The goodness or badness of workmanship is judged by two different criteria: soundness and comeliness. Soundness implies the ability to transmit and resist forces as the designer intended; there must be no hidden flaws or weak places. Comeliness implies the ability to give that aesthetic expression which the designer intended, or to add to it. Thus the quality of workmanship is judged in either case by reference to the designer's intention, just as the quality of an instrumentalist's playing is judged by reference to the composer's.

In some cases precision is necessary to soundness, but in many others it is not, and rough workmanship will do the job just as well. In some cases precision is necessary to the intended aesthetic expression but in others it is not and, on the contrary, rough workmanship is essential to it.

All workmanship, as we shall see, is approximation, to a greater or less degree. A designer may perfectly well expect and intend the roughest of approximation. Just as a composer by a notation like 'Con brio' may dictate how he wants to be played, so may a designer. If, on the other hand, the designer intends precision and gets it in the main, but finds it interrupted by passages of approximation he never intended, then the effect will be discernible, and this is bad workmanship. Good workmanship is that which carries out or improves upon the intended design. Bad workmanship is what fails to do so and thwarts the design.

All workmanship is approximation. There are in the world of manufacture, and not only in that of metaphysics, certain Ideas of which the things we make are necessarily imperfect copies. Nothing has ever been square because nothing has ever been straight, nor has anything been flat, nor spherical, cylindrical, cubical.

Socrates, in the *Phaedo*, maintains that the idea of absolute equality is suggested to us by the sight of things which appear to be approximately equal, because they remind us of something our souls knew before we

were born. A similar contention could of course be made about absolute flatness or straightness. I prefer another explanation for I do not think there can be much doubt how we have arrived at the idea of an absolutely flat surface when nothing flat exists. Whenever we make something 'flat' and find it is not flat enough, we always find that by taking more trouble we can make it still flatter: or we have always been able to do so hitherto: and so we find it easy to imagine we are approximating to a perfect flatness which it is just beyond our powers or patience to reach.

Unless we accept Plato's explanation and postulate a primordial inborn memory of ideal forms, our whole notion of geometrical perfection must have been built up by this sort of extrapolation.

Beyond this approximation to an unattainable geometrical ideal there is a second order of approximation to mere regularity. We do not always insist on exact duplication, or symmetry, or evenness of section, or fairness of a curve, or repetition of a unit.

This kind of approximation may be done deliberately, as it is for instance in the asymmetrical weaving of an essentially symmetrical pattern in some oriental rugs, for magical reasons; or it may be done as making a virtue of necessity where the desire or need for economy prompts us to rough workmanship. But, whatever reason we may give for it, in all such cases the workman admits to the work an element of the unaccountable and unstudied: of improvisation: either deliberately or because he has not the time or ability to prevent it.

Now a design is in effect a statement of the ideal form of the thing to be made, to which the workman will approximate in a greater or less degree. In a designer's drawing all joints fit perfectly! If the designer wants precise workmanship he is saying, as he shows the drawings and specification to the workman, 'This tells you how, ideally, it ought to be. Now show us how near you can get.' Or, on the other hand, he may be saying 'This is how it is supposed to be, but don't take it too literally. You know that a fairly rough job is usual in this sort of work, and that is what I should like to see.'

The trouble is that designs in so many trades are conceived in terms of combinations of simple geometrical forms. In architecture for instance it has hardly ever been otherwise. Now it happens that, as the Gestalt psy-

chologists have demonstrated, we have a very effective inborn ability and indeed compulsion to see the straightness in all the things which are fairly straight and the triangularity in all the things which are more or less triangular. [7] Consequently when we see a rough-hewn baulk of timber we assume at once, without having to learn the fact, that it was 'meant to be' a rectangular prism, which it manifestly is not. Conversely, when we see what, so far as the eye can tell, is a perfect rectangular prism, but there happens to be a great open joint in it, we know at once that the joint was not 'meant to be' there.

Let us provisionally give the name 'perfect' workmanship to that in which the achievement seems to correspond exactly with the idea: the spherical ball-bearing appears to be exactly spherical. Let us on the other hand give the name 'rough' to workmanship in which there is an evident disparity between idea and achievement. In rough work we see timbers 'roughly squared', components 'roughly lined up' and so on. In such cases we infer the idea from the achievement, the rectangular prism from the roughly squared timber.

The workman's achievement may differ from the idea for three quite separate reasons: it may do so because he intends that it shall, it may do so because he has not time to perfect the work, and finally it may do so because he has not enough knowledge, patience or dexterity to perfect it. The last of these reasons is the one with which every layman is familiar, and hence to the layman rough workmanship often suggests ineptitude. It is taken for granted that the man who did it must have been incapable of doing perfect work. To any workman or artist that idea seems laughable. Many of Rembrandt's drawings are rough, but not, one may safely say, because of ineptitude. But even where this is understood, the rough work, because less laborious, is, in the West, usually considered in some way inferior to the perfect. In the Far East this has not been so. In Japan the cult of a certain kind of rough workmanship has had a great following and become highly sophisticated.

In the workmanship of risk rough work is the necessary basis of perfect work, just as the sketch is of the picture. The first sketchy marks on the canvas may become the foundation of the picture and be buried, or they may be left standing. Similarly the first approxima-

[7] See R. Arnheim, *Art and Visual Perception*, chapter 2.

tions of the workman may afterwards disappear as the work proceeds, or they may be left standing. For the painter and the workman it is sometimes difficult to know when to stop on the road towards perfect work, and sooner may be better than later. In the workmanship of certainty, on the other hand, there is no rough work. The perfect result is achieved directly without preliminary approximation.

In the case of open joints which we know are 'not meant to be there' we are confronted by a kind of bad workmanship which is very common. The workman is essentially an interpreter, and any workman's prime and over-ruling intention is necessarily to give a good interpretation of the design. If he fails in this he will either distort or disrupt the design, or both. If he is using a constructing technique the result of failure is usually disruptive. Let us take, by way of a test-tube example, the circular joined wooden glass-frame or picture-frame in fig. 1. The frame is a ring: a continuous form. Continuity is evidently the essence of the designer's intention. If, then, by bad workmanship the ring is broken, as in fig. 2, the continuity is interrupted and the intention flouted. Anyone who is in the smallest degree sensitive to the aesthetic intentions of design must be aware of this.

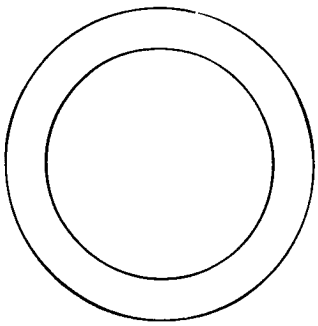

Figure 1

It is futile for a designer to aim at expressing continuity by means of a joined frame unless he is confident of getting expert workmanship. Otherwise he must seek the same effect by different means, either bending a single length of some suitable material into a ring, or cutting the ring out of a solid piece or else casting it. If a designer forces his intentions on workmen who, he knows, are not good enough at their job to carry them out, then he is quite as much to blame for the result as they are.

In all manufacture it is the rule rather than the exception to find that the degree of approximation in the workmanship of one piece of construction varies considerably in different parts of it and fairly often one finds rough work cheek-by-jowl with perfect work. The aesthetic success or failure of such a combination will depend on whether their being combined adds something to the design or detracts from it. If each acts as a foil to the other and sets it off, all is well, and we accept the combination without question as intentional; but, if

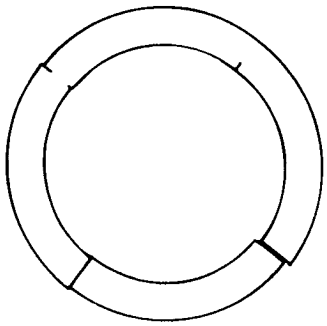

Figure 2

the rough work looks like an intrusion, mere evidence of carelessness, then the job is spoilt. Very often the apportioning of perfect and rough work is decided by the workman. If, as he interprets the design, he imports a combination which the designer did not ask for, he will have to do it with discrimination and understanding.

Before we can go much farther it will be necessary to improve on the terms 'perfect' and 'rough' which were provisionally adopted; for, as we know, 'perfect' workmanship only appears to be so and is approximate, while much workmanship in which some approximation can be detected by the naked eye is certainly not what one would ordinarily call rough.

Let us then say that, where the naked eye can detect no disparity between achievement and idea, the workmanship is 'regulated' or, in cases of extreme precision, 'highly regulated'. Where slight disparities can be detected let us say that it is 'moderately free'. Where there are evident (and usually intentional) disparities, as often seen in woodcarving and calligraphy, where precise repetition is on the whole avoided, let us say the work is 'free'. And, where we should ordinarily call the work rough, let us call it rough; remembering always that rough does not necessarily imply bad.

The term 'regulated' is apt, whether applied to the workmanship of risk or to that of certainty. On the other hand, the workmanship of certainty is all but incapable of free or rough work at present; but it must be remembered that, where construction is involved in the making of something, then although the components may be made by the workmanship of certainty, they will still nearly always have been assembled by the workmanship of risk. Regulated work is then possible, but, in quantity-production, bad is more probable, as in the case of the glass frame just cited.

Regulation is achieved in the workmanship of risk in three different ways, separate or combined. The first is dexterity: which means sheer adroitness in handling. The old-style shipwright with his adze can get a nearly true flat surface or a fair curve without any apparent guide, simply by coordination of hand and eye. Secondly, gradualness: the shipwright with his adze does not finish off the surface by removing handfuls of wood at each stroke, but in short light strokes taking off the wood in thin shavings. Lastly, shape-determining

systems: such as jigs, forms, molds, gauges. The variety of these in even one trade can be very large. In the first place many tools are partly self-jigging. The adze is, for one. The whole secret of using it accurately is that the curved back of the descending adze strikes tangentially on the flat surface left by the previous stroke—which becomes a partial jig—and rides along it so that the new stroke more or less continues the plane of its predecessor (fig. 3). In the second place, there are different degrees of certainty in jigging. Thus, if you want to cut a piece of notepaper straight, parallel and three inches wide, you can go to work in six different ways. Either (1) mark the line on the paper, take a knife, hold your breath, and run the knife along the line: in which case you are relying on dexterity; or (2) you can cut a little outside the line and then trim back to it by paring off many little narrow slips of paper in succession: in which case you are relying on gradualness. Or (3) you can cut along the line with scissors, which, like the adze, are partly self-jigging because in their case the newly cut edge of the paper butts against the upper blade of the scissors and steadies the sheet while they continue the cut. In this case it is easy to make a good job of the cutting. Or (4) you can cut with a knife along a ruler; the ruler is an effective jig and high regulation is still more certain than with the scissors. Or (5) you can use a guillotine, in which case it is really quite difficult to avoid high regulation, for the operation is now completely jigged. Or (6) the guillotine could be fitted with a fence and an automatic feed of some sort, in which case you would have the workmanship of full certainty and you could produce thousands of identical strips of paper.

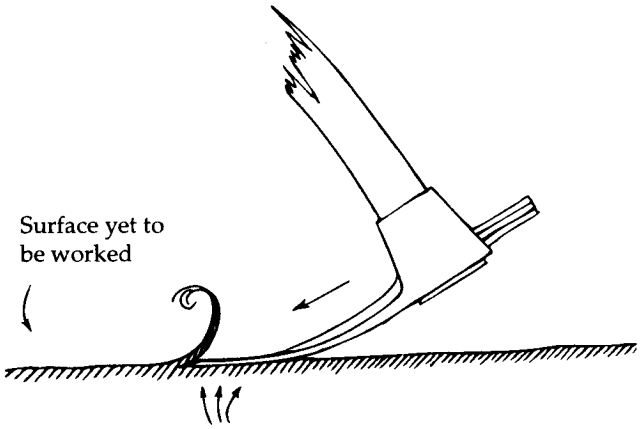

Figure 3

Now, of these methods of paper cutting, 1, 2, and possibly 3, will show moderately free workmanship. 4, 5, and 6 equally will show high regulation, and short of actual failure in workmanship it will be impossible to tell the results of them apart.

In free workmanship the flat surface is not quite flat but, when seen from close by, shows a faint pattern of tool marks: and the straight edge is not quite straight, but, seen close, shows slight divagations. The effect of such approximations is to contribute very much to the aesthetic quality in workmanship which I shall call *diversity*—and which will be discussed in chapter 6. The natural figure of materials such as wood, the play of

light in translucent materials, and the effects of wear, weathering and age, all contribute to diversity as well, but controlled freedom in workmanship has perhaps contributed more to the quality of our environment by way of diversification than any of them.

Free workmanship is now rare and becoming rarer. The workmanship of certainty is, simply of its nature, incapable of freedom. In old days free workmanship was the way of turning out cheap goods in quantity, but now even the smartest workman using it could not compete with the workmanship of certainty, and it survives successfully only in making a few things which the workmanship of certainty is incapable of, such as baskets and the products of the underwood industry, palings, spiles and hurdles, which are still in demand and have no acceptable substitute as yet. It is essentially deft, done with economy of effort. The liveliness and decision of it, and the fact that it is often associated with the countryside, have caused it to be thought that its practitioners must have taken pleasure in doing it: which may very much be doubted in some cases. The Welsh turner, James Davies of Abercych, told me that as a boy he had carved wooden spoons to be sold at fairs at, I think, twopence each. He said that at that price there was just time, when the spoon was finished, to look once at the inside, once at the outside, and then throw it over your shoulder on to the heap and start another! But having seen his work I do not doubt the spoons were a pleasure to look at.

Smiths are great exponents of free workmanship, for their trade above all needs deftness and decision. 'Strike while the iron is hot' is a very apt proverb.

There is no substitute for the aesthetic quality of this workmanship and the world will be poorer without it, particularly the countryside. It is impossible not to regret that it is declining but quite impossible to expect that it will survive on any scale as a means of decent livelihood.

It will be as well now to define the other main terms used in this book and to make explicit the relationships among them. I have introduced new terms with great reluctance and have tried to select words whose ordinary meaning would be violated as little as possible. I have, however, had to limit the meaning of a few common words, much as in scientific terminology

'stress' and 'strain' have very precise meanings which though derived from their ordinary ones are more circumscribed.

Before considering the definitions the reader may find it convenient to refer to plates 1-10b, which begin on the next page, and to the commentary on them, which is largely concerned with demonstrating something of the difference between regulated and free workmanship, and with contrasting the workmanship of risk with that of certainty.

Text continues on page 49

(Text continued from page 37)

Definitions and terminology are crucially important. A large part of the fruitfulness of scientific thought has come from one simple fact. It is that hitherto every scientific term has had an exact definition, verbal or mathematical, universally accepted. As a result communication in scientific terms between scientists has till recently been almost completely effective. Yet, on questions of art, communication is seldom so much as half effective. There is an immense amount of noise and little else. Definitions are the only possible basis for communication and we must have them. If they cannot yet be made final we must have provisional ones.

> ... Tzu-lu said, If the prince of Wei were waiting for you to come and administer his country for him, what would be your first measure? The Master [i.e. Confucius] said, It would certainly be to correct language. Tzu-lu said, Can I have heard you aright? Surely what you say has nothing to do with the matter. Why should language be corrected? The Master said, Yu! How boorish you are! A gentleman, when things he does not understand are mentioned, should maintain an attitude of reserve. If language is incorrect, then what is said does not concord with what was meant; and if what is said does not concord with what was meant, what is to be done cannot be effected...[8]

In the present context the important point when defining *design* is to distinguish between it and workmanship, and for this present purpose we may define design as whatever can be conveyed to the workman by drawings and by specification in words or numbers. For a fuller definition of design the reader is referred to *The Nature of Design*. In that book design is differentiated from invention and the essential nature of the activity of designing is examined.

The *designer*, as the term is used in the present context, means a person or group of people who decide the contents of the drawings and specification: that is to say, decide what information they are to convey. (The designer may of course also be the maker.)

The *intended design* of any particular thing is what the designer has seen in his mind's eye: the ideally perfect and therefore unattainable embodiment of his intention. The design which can be communicated—the design on paper, in other words—obviously falls far short of expressing the designer's full intention, just as in music the score is a necessarily imperfect indication

[8] *Analects of Confucius*, Book xiii, 3 (translated by Arthur Waley, 1938).

of what the composer has imaginatively heard. The designer gives to the workman the design on paper, and the workman has to interpret it. If he is good he may well produce something very near the designer's intention. If the workman is himself the designer he almost certainly will (but that does not imply that the designs a workman intends are necessarily good ones).

Now it is by reference to the intended design that we judge the quality of workmanship, and we have to infer the intention from what the workman has done. Moreover, the intended design will have been conceived in terms of the kind of workmanship, that is to say, the degree of regulation, which is economically suited to the product. Thus it is not possible to judge the quality of workmanship unless we have prior knowledge of that, and unless also we are in a position to judge what the designer might reasonably have been expected to intend. In times when there are established traditions in all branches of design and workmanship any moderately cultivated man will fulfill these requirements and will be a good judge of workmanship; but when, as now, traditions of design and workmanship are in flux, rapidly changing in many fields, more discrimination is needed.

The intended design of a thing and the *ideal form* of it may be, but are not necessarily, two quite different things. The ideal form is the most highly regulated form, and more highly regulated still than that. It is conceivable but not attainable: the perfect cylinder, the perfect rectangular prism, the perfect sphere. But the intended design so far from being concerned with these perfections may perfectly well be concerned with rough-hewn billets or cleft oak rails (plate 6). On the other hand the modern engineer's intended design, and the architect's, very often are conceived in terms of ideal forms: flat planes, straight edges, perfect cylinders, arcs of circles. This can happen because these are the forms which can be communicated with least trouble. Fully to describe the form of the billet in plate 6 would take any draftsman a matter of weeks.

Since the quality of workmanship is judged by reference to the intended design, it follows, as everybody knows, that what is good workmanship in one context is bad in another. The workmanship is good in plate 1 and also in plate 4, but if parts of the cabinet were finished like the carving it would be a sorry affair indeed.

It is possible in the same piece of work to put high regulation and quite free workmanship side by side, but unless the two are evidently dissociated (plate 25) very nice judgment is needed. Usually the highly regulated parts make the free parts look careless.

Technique is the knowledge of how to make devices and other things out of raw materials. Technique is the knowledge which informs the activity of workmanship. It is what can be written about the methods of workmanship.

Technology is the scientific study and extension of technique. In ordinary usage the word is slapped about anyhow and used to cover not only this, but invention, design and workmanship as well.

Workmanship is the application of technique to making, by the exercise of care, judgment, and dexterity. As opposed to design, workmanship is what for practical purposes the designer cannot give effective instructions about by drawings or words, although he can envisage it perfectly well. The designer is apt to imagine he has more control over workmanship than he has. Standards of workmanship become established in each kind of manufacture. The designer gets used to them, expects them, asks for them, and comes finally to believe he is getting them because he asks for them. Then he comes up against a firm who do not know their work and finds he is helpless. All he can do is to say 'do it again'. When the work is bad the second time, his resources are at an end. You cannot compel or command good workmanship by the terms of a contract.

Suppose that the designer can feel entirely confident that any of twenty or thirty firms working to the same drawings will turn out a nearly identical job, that is no evidence at all that the same drawings have actually enforced the same quality in each case. It simply means the firms are using about the same technique and are working to the same standard, being competitors; no matter who sends the drawings or what is in them.

Good workmanship is that which carries out or improves on the design, whether the design was made by the workman or another.

Bad workmanship fails to do so and thwarts the designer's intention in respect either of soundness or of comeliness: or else it makes things look equivocal in the sense that the material used appears to have, simultane-

ously, properties such as hardness and softness, or characteristics such as roughness and smoothness, which are incompatible with each other. A kind of equivocality is also produced by putting together formal elements, features, which are incongruous, such as a polished surface with a raw or jagged edge (chapter 9).

Skill is a word not used in this book. It does not assist useful thought because it means something different in each different kind of work. To a smith, dexterity is important but rarely in the extreme; but his judgment of certain matters, particularly heat, has to be brought to a pitch and decisiveness rarely needed or matched in woodworking trades, in which, however, more dexterity is often needed. Moreover, much of what is ordinarily called skill is simply knowledge, part of 'what can be conveyed by words or drawings'.

There is an old saying that when you have learnt one trade you have learnt them all. There is truth in it. Beside the special forms of dexterity and judgment which belong to any one trade, something general is learnt which makes it easier to learn others, though still not easy. This may be merely the habit of taking care but it seems to be more.

At all events 'skill' is ordinarily used to refer to an uncertainly distributed group of disparate things. Like 'function' you can make it mean what you please. It is a thought-preventer.

In the *workmanship of certainty* the result of every operation during production has been predetermined and is outside the control of the operative once production starts.

In the *workmanship of risk* the result of every operation during production is determined by the workman as he works and its outcome depends wholly or largely on his care, judgment and dexterity.

There are nowadays two quite distinct purposes to which the workmanship of risk can be applied. One is *preparatory*, the other *productive*. Preparatory workmanship makes not the products of manufacture but the plant, tools, jigs, and other apparatus which make the workmanship of certainty possible. The workmanship of risk should, I suggest, be termed 'productive' when it is used actually to turn out a product for sale.

The workmanship of certainty is almost invariably regulated and the workmanship of risk often is also. *Regulated workmanship* means workmanship where the

achievement appears to correspond exactly with the idea; things meant to repeat appear to repeat exactly, things meant to be square look exactly square, and so on. If, on the other hand, they do not appear to repeat exactly or to be exactly square, then there is an evident disparity between idea and achievement, there is approximation, and we call the workmanship *free*, or, in cases where the disparity is very large, *rough*.

In the workmanship of risk, in all trades, the course of historical development has usually been to increase the workman's power to regulate, and the standard of regulation aimed at has tended to get higher. There are indeed many instances where the workmanship of risk achieves higher regulation than that of certainty: for instance in the production of an accurately flat surface on a machined casting, or in optical work.

The workman is the term I propose for a man, woman or group of people who interpret and execute a design by the workmanship of risk using judgment, care and dexterity. I propose to use it as a generic term, like 'the executive' or 'the judiciary'. The workman is thus the agency which provides the tools, jigs, prototypes and other material basis for mass-production. In most trades the workman will at one moment be working freehand while at the next he will be applying the workmanship of certainty, making use of jigs and machine tools; and the preparation and combination of a series even of completely jigged operations or machining operations always involves judgment and care if not invariably dexterity.

By an oddity of usage 'workmanlike' is a laudatory word and 'workmanship' is at least neutral, while the word 'workman' tends to be used as though it meant the same thing as 'laborer'. I have a respect for many laborers, but I do not intend that meaning. One can no longer use the word 'craftsman'. It is getting flyblown. Too many cranks and too many people trying to grab higher wages have called themselves by it. To call a man a good workman should imply the highest respect, just as it once did to call a man a good seaman, no matter whether he was a shipmaster or an A.B.

It was the workman of other days who made, by the workmanship of risk, the tools, jigs and prototypes which enabled the machine-tools of our day to be built and with which in turn the workman of our day is now making the material basis for automation. The tools, jigs

and machines on which the workmanship of certainty will always depend are simply the stored embodiment of the care, judgment and dexterity exercised by the workman at an earlier time. And if machine-tools are now able to breed other machine-tools it is only because the workman is their matchmaker, their midwife, their nurse, doctor, educator and much more.

In the Science Museum in London can be seen the first of all lead-screws, which Maudslay chased for the first screw-cutting lathe, and one of the first planers, whose bed Roberts chiseled and filed flat. How many generations of screws and plane surfaces can those two machines have bred?

'The workman' covers Stradivarius and it covers the monk who drew the Chi-Rho page in the *Book of Kells:* for the workman may or may not also be a designer.

In the workmanship of risk, decisions are very often made by the workman which could have been made by the designer, and the workman may himself be the designer. Consequently the term 'workmanship' is often used far more loosely than the definition I have proposed will allow. By that definition nothing is workmanship which a designer could alter by speaking or writing a word or two; and workmanship is the exercise of care plus judgment plus dexterity. These can be taught, but never simply by words. Example and practice are essential as well. It is no part of a designer's job to teach them, even though he may be able to.

By numerical control certain designs can be translated (not interpreted) and 'told' directly to a machine tool so that a prototype or tool can be made without any care, judgment or dexterity being exercised at this stage. Ultimately automation may dispense with the operative altogether; but hardly with the workman, who will presumably remain indispensable to it somewhere, even if numerical control advances to the point that a set of machines, given a suitable program, can design and make another without the workman intervening at all.

'The workman' is to stand for a group of people just as much as for one. A group of people executing a design are closely analogous to an orchestra and decidedly not to a team. A team has either a driver with a whip, or another team opposing it. In an orchestra each player (workman)—is interpreting—(working to)—the same score—(design)—and is called on to play the instrument—(apply the technique)—in which he is expert,

at the stage in the performance where it is needed.

The workman is essentially an interpreter. It is usual to suppose that sometimes, in Ruskin's words '... the thoughts of one man can be carried out by the labor of others' because the design is 'determinable by line and rule'. If the designer, so-called, has no interest in the appearance of the job, his thoughts will be so crude that this may even be true, in fairly simple cases. But, where, on the contrary, the designer is a responsible man, it can never be true. It is no more possible for an Act of Parliament to determine the law than it is for a 'design'—meaning an affair of drawings and instructions—to determine the appearance of a thing. There are judges to determine what the Act means after Parliament has done its best to make its intentions clear. It is for the workman to determine what the designer means after he had done his best. So it is for the conductor or pianist to determine what Bach means after he has done his best, by means of a score. The judge, the pianist, and the workman are interpreters. Interpreters are always necessary because instructions are always incomplete: one of the prime facts of human behavior.

No drawing, however fully and minutely dimensioned, can ever be more than a sketch as regards the appearance of the thing drawn. The eye and mind discriminate things which can never be specified or dimensioned: the qualities and colors of surfaces, the minute variations of profiles, and still other nuances of shape too tenuous and subtle to describe in practice.

John Dreyfus's book, *Italic Quartet,* is a remarkable account of an undertaking defeated by a very good workman's inability effectively to interpret a kind of design to which he had not been brought up. It shows that Edward Johnston, the great calligrapher, clearly understood—and his patron did not—that, workmanship being interpretation, the quality of a type in his time ultimately depended not on the designer but on the punch-cutter; for all the meticulous instructions that a designer might give him, and that Johnston in this case did give him, and which are illustrated in the book.

Although workmanship is interpretation, I do not suggest that anything a workman gives us can be as moving as what the performer of music does. No design lives in the same world as music, and the performance of music allows more subtle and deep expression than any workmanship can possibly attain to.