Kinds of Seeing in Designing

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How do architectural designers develop their ideas? By a kind of reflective conversation with the materials of a design situation. A workshop example of a first-year design project is used to illustrate the process, and to suggest some of the ways in which this sort of interaction works.

Introduction

We shall describe architectural designing as a kind of experimentation that consists of a reflective 'conversation' with the materials of a design situation. A designer sees, moves and sees again. Working in some visual medium (drawing, in our example) the designer sees what is 'there' in some representation of a site, draws in relation to it, and sees what has been drawn, thereby informing further designing.

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In all this 'seeing' the designer not only visually registers information but also constructs its meaning . . . identifies patterns and gives them meanings beyond themselves. Words like 'recognise', 'detect', 'discover' and 'appreciate' denote variants of seeing as do such terms as 'seeing that', 'seeing as' and 'seeing in'.

Our purpose here is to explore the kinds of seeing involved in designing and to describe their various functions. At local and global levels, and in many different ways, designing involves interactions among making and seeing, doing and discovering. Using a workshop illustration, we shall suggest some of the ways in which this sort of interaction works, and describe some conditions that *enable* it to work.

Quist and Petra: a microcosm

Imagine a first-year design studio in a department of architecture. The studio project is the design of a school, for which the students have been given both a programme and a site. They have been working on this project for about a month when the studio master, Quist, sits down next to one of the students, Petra, to conduct a design review[1]. Petra begins by describing how she has had 'trouble getting past the diagrammatic phase'. Then, in response to Quist's question, 'What other big problems?', she sets out the following account of her process to date:

> 'I had six of these classroom units but they were too small in scale to do much with. So I changed them to this more significant layout (the L-shapes). It relates grade one to two, three to four, and five to six grades, which is more what I wanted to do educationally anyway. What I have here is a space which is more of a home base. I'll have an outside/inside which can be used and an outside/outside which can be used – then that opens into your resource/library thing.'

Figure 1 displays Petra's drawing.

Let us assume for a moment that this snippet of drawing and description represents the *whole* of a design process. How shall we describe it?

First of all, Petra describes a move she has made. Beginning with the 'six classroom units' (she does not tell us how she got them in the first place) she has found them 'too small in scale to do much with'

1. Quist and Petra are fictional names invented by Roger Simmonds who originally observed the studio in which this dialogue took place, as part of a study of architectural education directed in the mid-1970s by Dean Maurice Kilbridge of Harvard and Dean William Porter of MIT. This design review has been described and analysed at length in Schön (1983).

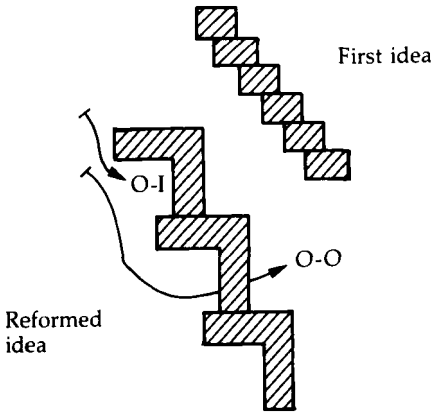

Figure 1: Petra's Move. How Petra, a design student, illustrated her design reconceptualisation (for a school) for her studio master.

and she has changed them into the L-shapes – 'this more significant layout'. What we mean by a 'move' is just such a change in configuration as Petra now describes in words and has made earlier in her drawing. This move of hers can be seen in two ways: first, as completed transformation, a shift from one drawn configuration to another, and second, as the *act* of drawing by which the transformation is made.

Petra's move begins with a particular way of seeing the first configuration, 'six of these classroom units'. Her way of seeing them involves a judgment of quality: she finds them 'too small in scale to do much with'. Hence, she changes them to the L-shapes, which she sees as 'this more significant layout'.

With her first visual judgment, Petra has set a problem: 'too small in scale'. She makes her move in order to solve this problem, and with her subsequent description, 'this more significant layout', she expresses a second judgment, namely, that the problem she initially set has now been solved. Petra's judgments are embodied in acts of *seeing*. She sees that the six classroom units are too small in scale to do much with, and *sees* that the three L-shapes are more significant (clearly, she means to indicate that they are more significant in scale, whatever other significance they may also turn out to have). Her design snippet can be schematised as *seeing–moving–seeing*.

In this schema, two senses of the word 'see' are involved. In the first, Petra 'sees what's there'. She literally sees the classroom units she has drawn (and sees them as a coherent pattern . . . a point to which we shall return). In the second sense, she sees that they are too small in scale. The word 'see', in its second sense, conveys a judgment about the pattern 'seen' in the first sense. The two senses are merged in Petra's statement, 'They were too small in scale to do much with'. In a single act of seeing, she both visually apprehends the configuration and judges its scalar quality.

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Petra's designing depends on her ability to make just such normative judgments of quality, to see what's bad and needs fixing, or what's good and needs to be preserved or developed. In the absence of such qualitative judgments, her designing can have no thrust or direction; it would be entirely unmotivated. She would be able neither to set problems nor to tell when she has solved them.

Two features of such judgments should be noted. First, as Chris Alexander pointed out long ago, our ability to recognise qualities of a spatial configuration does not depend on our being able to give a symbolic description of the rules on the basis of which we recognise them[2]. For purposes of designing, we need only recognise when something is mismatched to a given context and when a move makes that something better or worse in relation to its context. In this instance, Petra does more. She only recognises a mismatch but names the quality ('too small in scale') in relation to which she recognises it.

Secondly, Petra's judgment is *hers*. It is, to this extent, a subjective judgment. Other designers may not agree with her. For example, some of them might find her six classroom units quite significant enough. The point is not that Petra judgment is wrong. A survey of expert designers might show that her judgment is entirely consistent with good design practice, or with certain principles governing the uses of scale in design. The point is, rather, that as long as her judgments of significant scale are internally consistent, at least in this design episode,

2. See, for example, Alexander's (1964) account of the design process of Slovakian peasant shawls.

such subjectivity is no obstacle to her designing. On the contrary, Petra's snippet of designing can be understood as a kind of *experiment* – a kind that we shall call a 'move experiment' – just *because* of her subjective judgments of scalar significance. Judging her first configuration as 'too small in scale to do much with' she makes her move, changing it to the L-shapes, and finds the new layout 'much more significant'. Conceivably, she *might* have found that the change in configuration brought no improvement in significant scale.

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Having seen the problem and made her move, she might discover that she had not succeeded in solving the problem. She has to see the results of her move in order to discover that her experiment has 'worked' or, as we shall say, that her move has been *affirmed* rather than *negated*. Her experimentation is an objective process in the sense that she can make mistakes and become aware of them. And it is her ability to make subjective judgments of quality that renders this kind of objectivity possible.

In several important respects, appreciative systems are variable. They may vary from individual to individual. For example, some other designers may not share Petra's judgments of significance and scale. On the other hand, among the members of a certain group of designers, there may be a large area of overlap in appreciations, sufficient even to allow us to say that these individuals share a *common* appreciative system. From such an observation, we might infer the existence of a particular *design community*.

Appreciative systems are variable in the further respect that they may evolve over time. It is not too much to suppose that Petra learned at some point in her career to find configurations like the six classroom units too small in scale to do much with. Indeed, how one develops a particular kind of appreciative system seems to have a great deal to do with the process by which one learns to become an architectural designer. And how an appreciative system develops and comes to be shared by a group of designers seems to have a great deal to do with the process by which design communities evolve.

3. See Vickers (1965) and (1968) who points out, following Alexander, that appreciations are expressed in acts of judgment that we are able to make, tacitly, *without necessarily being able to state the criteria on the basis of which we make them.*

The nature of appreciative systems

Drawing on Vicker's idea of appreciative systems we can reformulate Petra's move experiment. We can say that on the basis on her initial appreciation of the six small classroom units, she formed the *intention* of changing them to a more significant layout. She then made her move and discovered, through her appreciation of the new configuration, that she had *realised* her intention. To this extent, her move was affirmed. It is worth noting that her intention was not fully established at the beginning of her design process, but evolved through her appreciation of an intermediate design product. Her intention developed in 'conversation' with the process by which she transformed her design. An evolving intention is one of the *outputs* of her designing.

It would not be correct, however, to say that Petra's move experiment consists of nothing more than the formulation and realisation of an intention. On the contrary, as we shall now show, one of the most striking features of this snippet of designing is the role in it of the discovery of certain *unintended* consequences.

After she has noted the more significant layout of the L-shaped forms, Petra goes on to say that:

> 'It relates one to two, three to four, and five to six grades which is more what I wanted to do educationally anyway. What I have here is a space which is more of a home base. I'll have an outside/inside which can be used and an outside/outside which can be used . . . then that opens into your resource/library thing.'

Beginning with the intention of producing something of more significant scale, Petra finds that she has also done other things. She has spatially grouped proximate grades so that, for example, grades one and two are placed next to each other in the same 'L', separate from (but adjacent to) the 'L' that contains grades three and four, something she says she 'wanted to do educationally anyway'.

She has created here a space, presum-

ably, the whole space made up of the three Ls – which is 'more of a home base'. And she has created two kinds of spaces (outside/inside and outside/outside) that she finds 'usable'.

These discovered consequences of her move were not part of her intention for it. (We infer that even though the new grouping of classrooms fits 'what she had wanted to do educationally anyway', it was not part of her intention for this move.) Nevertheless, having drawn the L-shapes, she sees that she has done these things. And it is clear, in context, that she finds qualities in them that she judges to be desirable. Indeed, she offers this additional description of the L-shaped layout as a further justification for her move.

We can now spell out a more complete account of the conditions under which a move experiment like Petra's is affirmed: the intended consequences of the move are achieved and its unintended consequences are judged desirable. In colloquial terms, 'you get what you intend, and you like what you get'.

One of Petra's references suggests a slight extension of the meaning of the phrase, 'like what you get'. Petra sees that the two kinds of space are 'usable', that is, she imagines uses for them. Hence, 'like what you get' should be modified to include 'like what you see that you can make of what you get'. In a similar vein later on in this design review, Quist notes, as he draws on tracing paper over Petra's drawing, that 'the spaces in here can be one of nooks'. He notices, given the dimensions and relations of the building forms he has drawn, that these forms could be made into nooks; and he offers this observation, as Petra did, above, as a further justification of a move he had initially made with a different intention in mind.

In this snippet of seeing–moving–seeing, then, Petra detects unintended as well as intended consequences of her move and judges, or appreciates, their qualities. One might say that her appreciative system enables her to recognise unintended consequences and qualities of the change she has made. One might also say that her ability to recognise features of the new configuration gives her access to parts of her appreciative system that might not otherwise come into play in this design episode.

Different kinds of seeing

Let us note, at this point, that we have introduced a number of terms to refer to different kinds and aspects of 'seeing' in designing. We have referred to *seeing*, in the sense of visually apprehending what is there to see; *detecting* the consequence of a move; *judging*, or *appreciating*, the quality of a configuration, which may be produced as a consequence of a move; and *recognising* a feature or quality, that is, becoming aware of it regardless of our ability to state criteria by which to do so.

We can now go on to observe that the qualities Petra intended to produce with her move and the qualities she finds she has unintentionally produced are of very different kinds. 'Scale', or 'significant scale', is a quality of spatial configurations that belongs to a domain that might be labelled 'form'. It is a term peculiar to architecture as well as to other plastic arts, e.g. painting, sculpture, photography, and it is compositional by nature. Whether or not a given configuration is significant, or significant enough, depends, at least in part, on its relation to other configurations around it in some context considered as a formal composition. One might say, for example, that a spatial element of a particular size and shape is too small in scale even though it exists in a purely abstract composition, with no reference to objects in the world outside it.

On the other hand, 'home base' seems to refer to a feelingful quality of places. In order to function as a home base, a space must serve as a special sort of place for those who use it and they must experience it in a special way. 'Outside/inside' and 'outside/outside' refer to kinds of spaces defined both by their relationships to building shapes and by the kinds of uses that can be made of them. And when Petra says that the L-shapes 'relate grade one to grade two', and so on, she refers to functions of spaces that have particular meanings within the programme for a school.

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Let us call the domains from which these descriptions are drawn 'form', 'feelingful qualities of places', 'organisation of space' and 'programme/use'.

Petra begins to work in one domain, the formal one. It is, however, in the other domains listed above that she discovers the unintended consequences and qualities of her move. One might ask why she does not include all of them in the formulation of her original intention, why she does not work simultaneously in many domains? To this question there are two answers, closely coupled. First of all, at the point of conceiving and undertaking her move, Petra does not seem to have been aware of all the domains that would be affected by it. She begins with attention to 'significant scale' and needs to see what she has drawn in order to *discover* the other consequences and qualities she later identifies as affected by her move. Second, there is the question of *complexity*, a feature essential to designing. We are not designing when we merely place one book on top of another, for example, but we *are* designing when we arrange books on a shelf with an eye to such criteria as ease of access, grouping of books by subject matter or author, and juxtaposition of books by size or colour. When we design, we deal with many domains and many qualities within domains; our moves produce important consequences in more than one domain. In the extreme case, a move informed by an intention formulated within one domain has consequences in all other domains. Because of our limited information processing capacity, we cannot, in advance of making a particular move, consider all the consequences and qualities we may eventually consider relevant to its evaluation[4].

The sequential structure of her seeing–moving–seeing enables her to manage complexity

If Petra had initially formulated her problem in terms of all the consequences and qualities in all of the domains she eventually found worthy of mention, the problem-solving task confronting her would have seemed overwhelmingly complex. Working initially in one domain, however, she can allow considerations in other domains to enter into her work piecemeal as she discovers the unintended consequences of her moves. The sequential structure of her seeing–moving–seeing enables her to manage complexity.

For these two reasons then – reasons we might shorthand as 'limited awareness' and 'limited ability to manage complexity' – designing (to the extent that it resembles Petra's snippet) has the conversational structure of seeing–moving–seeing, where the second 'seeing' involves recognition of unintended as well as intended consequences, and where unintended consequences fall into domains other than those in which the problem and its prospective solution are initially formulated.

From a slightly different angle, the conversational structure of designing is a means of harnessing our remarkable ability to recognise more in the consequences of our moves than we have anticipated or described ahead of time. Having made her L-shaped layout, Petra recognises in it a homebase, an outside/inside and a spatial grouping of grades one and two. Interestingly, she does not see in it (or does not mention) consequences and qualities of no importance to her; her appreciative system has apparently screened these out. But the consequences and qualities she selects for attention do become, from that point on, conscious design considerations. Having created a 'home base', for example, Petra might think twice about any move that threatened to spoil it. Because she can recognise in her moves more than she has intended for them, she can sequentially tackle the complexity of her design situation.

Working in multiple domains

As we consider all this, however, we must remember that Petra is a first year design student. Perhaps a mature architect, someone like Quist, the studio master, can work simultaneously in many domains. Certainly, when Quist begins to draw over Petra's drawing later in this protocol, he uses terms that belong to many more domains, for example, to domains that might be labelled 'siting', 'cost', 'construction technology', 'circulation', 'building character', and the like. Perhaps he is

4. Herbert Simon (1969) introduced this idea into the theory of designing. See also George Miller's famous paper on short-term memory and the 'magical number seven plus or minus five' (1956).

able to work simultaneously in several of these domains, imagining how possible moves may affect all of them. Indeed, we might speculate that Petra herself, when she has completed this design project, will have developed a better 'feeling' for the possible interactions of design domains – a better understanding, for example, of the ways in which particular kinds of school building configurations may lend themselves to certain kinds of uses while constraining others, produce or exclude certain kinds of usable spaces, suggest or inhibit certain feelingful qualities. If this is so, we can see her designing as a *cumulative process of discovery* whose output is not only an elaborated intention (as mentioned above) but an enriched understanding of relationships among moves, consequences and qualities across multiple domains. And to the extent that Petra is able to see her next project as a variant of this one, as Quist is able, perhaps, to see many new projects as variants of project experiences stored in his repertoire, then she may be able to work from the very beginning of that project across several domains at once.

We must introduce several caveats. In our description of Petra's designing, we have proposed categories that seem to correspond to the terms she uses as she describes her starting configuration, her move, and its consequences. That is, we have constructed domain categories on the basis of her language. But it is possible that she entertains design considerations that she does not put into words. And it is also possible that in her design thinking she actually groups (or separates) terms we have taken to belong to different (or same) domain-categories. The design domains we have named are constructs made to account for the evidence of her design behaviour, including especially her verbal description of that behaviour, and such constructs may be mistaken, particularly when they are based on the slender evidence of such a protocol as this. One could imagine experiments aimed at developing a more grounded description of the structure of a designer's 'domains-in-action'.

We should also question the *connectivity* of design domains. Given some construction of a set of design domains, how, in an individual's designing, do they actually interact? Are they interconnected in the sense that a move made in any one of them will have discovered consequences in all the others? Only in some others? We should ask, further, whether the identity and connectivity of design domains should be considered only as features of actual design thinking, an item of what might be called 'design phenomenology' – or whether they also belong to a normative perspective on designing. It seems quite clear, for example, that students in architectural studios like Quist's are exposed to particular families of design domains and particular views of their appropriate interconnection. This is an important part of what students learn in the studio, and of what they are meant to learn. Particular views of the identity and connectivity of design domains seem to be inherent in design communities, and from their perspective, help to distinguish experts from novices.

It is a short step from this to the further observation that design domains develop. Individual designers become aware of new domains, or learn to restructure relationships among existing domains, thereby increasing the scope of complexity with which they can or must deal. When a designer becomes newly aware of the existence and importance of one new domain – for example, the experience of movement through paths created by spaces in a building – her designing may be greatly complexified and transformed. But it must be said that we know very little about the processes by which, as design domains evolve, designers develop new ways of seeing.

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