DESIGN INNO

P/A presents a lively discussion among several young architects that took place at the Cambridge School of Architecture in Cambridge, England, on March 4, 1966. Christopher Alexander, the chief speaker, proclaims what may turn out to be a new brand of functionalism based on the preferences, desires, and behavior of people. He denounces as irrelevant most architectural solutions to environmental chaos via the single building as well as architects' traditional visual approach to design. None of the other participants, all practicing architects, agrees with him completely, although one of them makes a strong case for the superiority of Levittown over Park Hill, a widely publicized, architect-designed apartment project in England. The topics probed include the fee structure, Place des Vosges, Corbusier, and the scientific method.

The discussion was tape-recorded by Nathan Silver, American architect, author of "Lost New York," and currently Third Year Studio Critic at the Cambridge School of Architecture. Since the discussion took place, Alexander has further developed his ideas and changed his terminology. Rules and relations are now called patterns, and the newly founded Center for Environmental Structure in Berkeley has begun the task of constructing a complete environmental pattern system. Alexander is currently finishing a book to be titled "Environmental Structure."

PARTICIPANTS:

CHRISTOPHER ALEXANDER

Faculty member of the School of Environmental Design, University of California at Berkeley; co-author of *Community and Privacy;* author of *Notes on the Synthesis of Form.*

COLIN ST. JOHN WILSON

University Lecturer in Architecture, Fellow of Churchill College, Cambridge University; collaborating architect of Harvey Court, Cambridge, and for the new National Library, London; architect for the Civic Center, Liverpool.

LIONEL MARCH

Member of the firm of Sir Leslie Martin, collaborating planner on the expansion of the government center at Whitehall, London, and Assistant Director, Centre for Land Use and Built Form Studies, Cambridge University.

CHRISTIAN NORBERG-SCHULZ

Norwegian architect; Lecturer in Architecture at the Technical University of Norway; author of *Intentions in Architecture.*

MICHAEL BRAWNE

English architect, author of *The New Museum,* and Fourth Year Studio Critic, Cambridge School of Architecture.

ALEXANDER: Where does the environment get its organization from? Like most architects, we are apt to answer this question in terms of images and individual buildings. However, over the last 50 years or so, some architects, including myself, have come to the conclusion that in talking about the environment as a whole, you have to throw away completely the old concepts of images and buildings.

It is my contention that the environment gets its physical organization from a system of rules imbedded in the culture. These rules are not functional; they're physical, geometrical rules, which say, for instance, that there should be streets with sidewalks, and so on. None of these rules are followed 100 per cent of the time, but most of them are followed most of the time, they're widely shared, and, most important, they are understood by developers, contractors, and bankers as well as by clients and most people in the culture. Although he may try to vary these rules (and occasionally a valuable architectural innovation will present an entirely new rule that may then be accepted in the culture), most of the time architects themselves are working within this rule system. They design buildings according to the relations currently accepted as normal for schools, parks, houses, streets, apartment blocks, and so on. Minor variations in the way these rules are carried out when built have virtually no effect on the functional organization of the environment, although I don't want to diminish the work architects sometimes do — inventing new rules. But I do want to distinguish very sharply between innovation, which is the invention of new rules, and implementation, which is the carrying out of building according to the rules now extant. In the architect's normal view of his task, these two are totally confused.

This distinction raises the following questions for innovative designers: Under what circumstances is it necessary to invent a new rule (to invent a new physical relation for a specifiable condition)? How do you go about it? How do you get a new physical relation from your observations and investigations? The answer is this: There is only one kind of situation when it is necessary to write a new rule, a new relation; it is when there are conflicting tendencies at work — either in people themselves or in the social sys-

tem — and these conflicting tendencies need to be resolved.

The following is an example of conflicting tendencies; it occurs in suburban housing patterns. The problem: How far back is the front of the house from the street? In suburban areas where there's enough room, you find that houses are built with the front a long way off the street, farther than is demanded by law. And people persist in doing this. On the other hand, by and large they don't use their front garden to sit in. So there is this large, apparently useless, area in front that people insist on having. Why? Two conflicting tendencies are at work here: First, they want their door to be far enough off the street so that when someone comes to the door, it is quite clear that he is paying a visit. They don't want it to be possible for some stranger to loiter near the front door ambiguously, while actually on public land. And then people have a second tendency: They want to make an efficient use of their land. The two tendencies have contradictory consequences: The first implies that the house should be back off the street, and the second, if it were allowed to operate, would put the house forward on the street. The designer's job in this case is to point out that these two tendencies, even though they're in head-on collision, can, by reorganization, be made to slide past each other. He can point out that if the lot were very narrow, particularly in the front — lots could be wedge-shaped, instead of being parallel-sided — or just narrow and very, very deep. Either of these patterns would both allow the front door to be off the street and avoid wasting land in the front yard. So, to me, the designer's job is to create new relations in response to clear-cut observed conflicts like the one I've described. They occur all the time and on a much larger scale than the simple human desires I have described. Every time you see one of them, a new relation needs to be invented.

A second point is: If you are injecting new relations into the rule system, what guarantees have you that the system as a whole will be coherent? I'll give an example of the kind of breakdown that happens in the rule system — again talking about houses on suburban lots. As usually organized, the kitchen is on one side of the house and the bedrooms are placed

Photo: Nathan Silver

Christian Norberg-Schulz and Colin St. John Wilson.

"Do you really think images are taken out of the blue?"

on the other. With the advent of the automobile, new rules had to be formed — for instance, that the car had to come right up to the house off the street. This rule was so important that it was made into a zoning law and you got the characteristic pattern of the driveway being on the side of the house alongside the kitchen. Seemed fair enough. But, at the same time, a new imbalance was introduced, a new mistake, because that car was now located alongside the bedroom of the next house and was waking up the children. Thus, the problem of maintaining the coherence of the rule system as a whole is this: Each time a new rule is injected, the entire system must respond to that injection and other rules change to maintain the order of the whole.

Everybody is saying today that the environment we have at the moment is chaotic, and I think they're right. It's chaotic because the rules governing it are incoherent and uncoordinated. Mechanisms to insure coherence have to be developed at the level of metropolitan government so that new rules injected into the rule system can be coordinated with existing ones. This is the second problem that emerges when you take the attitude I'm taking.

My whole view of design, then, does not concern the architect, but, instead, the rule system as a whole. Therefore, if you're talking about the organization of the environment, it doesn't make sense to ask whether the city should be "imageable." This is a traditional kind of question that came out of architecture as it was practiced in the Renaissance and the 19th Century and is still with most architects.

CHRISTIAN NORBERG-SCHULZ: I have several questions. First, you maintain that the architect's contribution is irrelevant, but that there are situations where it may be necessary to change the rules. This I agree with. The architect always has the task of making a synthesis of conflicting factors. Isn't that, in fact, what the architect contributes in every single situation? To maintain the rules is a continuous process; the architect is always contributing. Secondly, you talk about images not making sense in the organization of the environment and yet you used images in your examples — the front garden, for example. And, if these are concrete physical rules, how do you define them without using some kind of images, some kind of form?

ALEXANDER: Of course I use images. But I think that the search to make the city "imageable," the way Kevin Lynch does it, and to lay down principles about how images ought to be constructed, are completely irrelevant enterprises. If you want to look at my geometrical rules as images, they are, but each one of them has tremendously powerful reasons behind it. They don't just come out of the blue because some architect or Kevin Lynch thinks that people appreciate such and such formal kinds of images.

NORBERG-SCHULZ: Do you really think images are taken out of the blue?

ALEXANDER: Some of them, yes. Lynch says that certain kinds of characteristics make a city imageable. They're not taken out of the blue in the sense that he has observed that those are the sorts of properties people remember. That's very

true. They're taken out of the blue, however, in a functional sense. Lynch wants, and specifically tries, to put edges, nodes, and paths into cities regardless of what they're doing. He wants a city to be made of **images.** He tries to place a highway so that the city will look nice from it, which is ludicrous. It's a concept not rooted in the nature of form as a functioning, operating entity.

Coherence and Cultural Development

MARCH: There are two points here. One is that Lynch will tend to define what Cambridge and Boston look like and then he will put his roads alongside the important events in these cities. But, instead, you could put a road down and events will happen. That's the more important thing to do. Secondly, about introducing new rules into the system and the problem of keeping the system coherent: Suppose it were possible to isolate problems. If you could, it's almost certain that the solution will not work coherently with the rest of the rules. Instead, you will create a new problem. For instance, imagine a primitive, closed society, whose problem is rain on their heads. You put thatched roofs up to solve it. Then rats get into the thatched roofs and so you burn the roof to get rid of the rats, but then the rain comes down, and so on. Then, along comes some wise chap who says here is some DDT, and it'll do the job very well, but then you get DDT all over the food. There's something important about cultural development here. You've got a closed cycle until something from outside comes along — a drought, an earthquake — when it is likely that something new will result. The Japanese made their houses light so they could throw them back up immediately after a disaster. Some other culture would say we'll make them so heavy they'll never be knocked down. Different solutions to the same problem arise. In an open society, we set off on something — say the motor car, a system of private transport — and after a time most of the problems we deal with have been created by this new innovation. Any solution at any time to a problem has to solve that problem and all the others that have been created since. So you still have the original problem — that is, private mobility. Certain architects say, Let's think this right through from the beginning; they'll say we don't have to have private cars at all. Instead, we can think of some kind of loop, or something, that will get people where they want to go. This is all right, but if you do it, you've only got to unravel problem-solution situations all the way down, and in doing that you're in danger of finding yourself unraveling the whole cultural situation as

Photo: Central Office of Information, London

Park Hill Apartments, Sheffield, England.

"Park Hill seems to fix a distinct social pattern into a building."

well. What you can certainly do is innovate from a given point, as we did in Whitehall for instance. It's impossible to reorganize the whole civil service to get a decently designed office building. You've got to start with the civil service itself as it stands at the moment — an accumulation of extraordinarily anachronistic rituals. You can't redesign the service and say now we're ready to put a building up because you've got a nicely designed organization here. You simply start with it and to some extent the design will suit it and in another way it will innovate as far as it can.

ALEXANDER: What usually happens, if you look at the history of modern architecture and the buildings that have proposed new kinds of solutions, is that the inventive architect seizes on opportunities to try and design something better than what would usually be built. This seems constructive and sensible. I, however, don't think it is. It makes more sense to innovate by inventing individual relations and complexes of relations than to innovate whole buildings. The reason is simple. Individual relations can be criticized and modified successfully. Whole buildings are too hard to criticize.

We've heard a lot of discussion in architectural circles recently about the analogy between design and science as Karl Popper described it in his book **The Logic of Scientific Discovery.** It used to be thought, Popper explains, that scientists observed facts and then by a process of induction extracted hypotheses and theories from them. What really happens is that the scientist, in a rough kind of way, makes guesses; he invents theories, guesses at hypotheses, and states them in such a way that they can clearly be shown wrong by new facts. He will then experiment to show his or somebody else's theory wrong. Theories, then, are always written in such a way that they can easily be shown wrong by ascertainable facts. This emphasizes the creative nature of science far more than the old picture. Architects love this explanation because the analogy put forward is that a new building is like a theory, an hypothesis, and one can criticize it as such. They love it, too, because Popper made it quite clear that the scientist's guess could be quite wild [laughter]. It's an interesting analogy, but it doesn't work for architects because the crucial point in Popper's idea was that when you put forward a scientific theory, literally one critical observation, which might result from a deliberate experiment, can knock it down. But this just isn't true of buildings. It doesn't make sense to say that if you put up a building as a hypothesis, it can be refuted in any sense. Obviously, you can't criticize a building in a clear enough way to destroy it. But Popper's analysis does show how science manages to move forward. And we need a way of moving forward in architecture, by creative jumps that can be criticized and refuted. One way is with the rules I've described: If you propose one new relation, like the one I gave about suburban lots, the tendencies that gave rise to the conflict are so limited and so clear that two things can be done. You can say either that this new relation is an adequate response to the conflicting tendencies, or that the tendencies weren't accurately described. Thus a **relation** can be effectively criticized, whereas an **entire building** cannot. That's one reason for saying that innovation should take place relation by relation, never forgetting that they are interlocked in complex ways, with good reasons advanced for each one. Another reason is more pragmatic; it is that the number of things going on in a building is so immense that it's really tough to have an adequate response to them. Even designers really can't be sure about what they're doing: Has he got the whole picture? Has he identified all the needs? He doesn't really know. Finally, I doubt that architects are

best for making these innovations because in their present professional setting they are always concerned with other things.

VOICE: Who is better equipped?

ALEXANDER: We need to start training people specifically equipped to innovate and other people to carry out implementation. I see very clearly in the future a fairly sharp split between these two kinds of activities.

WILSON: You were a little unfair when you said that architects say they build as an hypothesis because it enables them to be wild. Do you mean that invention isn't going to be the result of an hypothesis made sooner or later by reasonably informed people?

ALEXANDER: No. What I'm saying is that the idea of an hypothesis is that it can be effectively criticized. If a series of concrete facts are brought up that ruin it, it is chucked out. But you can't persuade anyone to chuck out the idea of a whole building, because it is so complex that you don't know what you're persuading them to chuck out. For instance, they won't discard the idea that it should have a roof.

What Do Architects Invent?

BRAWNE: Popper deals with only those processes that are clearly testable and he would never, as no sensible architect would either, say that all aspects of the problem, or of architecture, are testable. There are long chapters of Popper that deal very clearly with the demarcation between what is testable and what is not testable. So only very clear aspects of architecture could ever be tested or refuted and therefore only certain aspects of the hypothesis could come under your method. Furthermore, it seems to me that I can think of a large number of environments in which the rules are the same but the quality of the environment is drastically different. So your saying that it is only the rules that determine the environment bothers me. I think there is a whole set of qualities outside the field of relations and outside the field of strictly testable events.

MARCH: Could you give an example of two environments where the rules are the same and the organization differs?

BRAWNE: If we think of streets, pavements, and buildings of different types, Cambridge is a very different place from, say, Crawley New Town. Alexander's contention was that the rules exist in society and were outside the control of the architect. I would agree with Norberg-Schulz that it is the architect who creates these rules.

ALEXANDER: Oh, heavens, no. Let's take an example: Any bank in England. The counters have little windows in them — right? Did architects invent that rule?

BRAWNE: They invented the solution for that rule.

ALEXANDER: Of couse they didn't.

MARCH: Naturally, if you are talking about King's College Chapel, you're talking about the rules that were extant when that building was built. We're left with that. In an historic city, you have built-in rules. There's the example of the introduction into France of the indoor theater. The Place des Vosges was designed as a square, a beautiful architectural square, which we preserve today as a space. It was in fact an urban room with a market in one corner. In the middle were two theatrical groups; one of them decided that the weather wasn't consistent and they'd like to go indoors. So in the middle of the Place des Vosges there arose a wooden shack and that was the first indoor theater in France. It is difficult to know how that shack would have succeeded and become the grand opera eventually without there being a combination of function and form. The function of indoor theater succeeded, and the form that developed from it was created by the people who were creating that function. They didn't get an architect and say what should we do about it; they did it themselves. It was successful and from that point on architects were consulted and asked what should we do about this already established function. From the point of view of cultural development, architects and planners are in a very conservative position. We are able to give form to established functions but we are not able to generate the form — unless

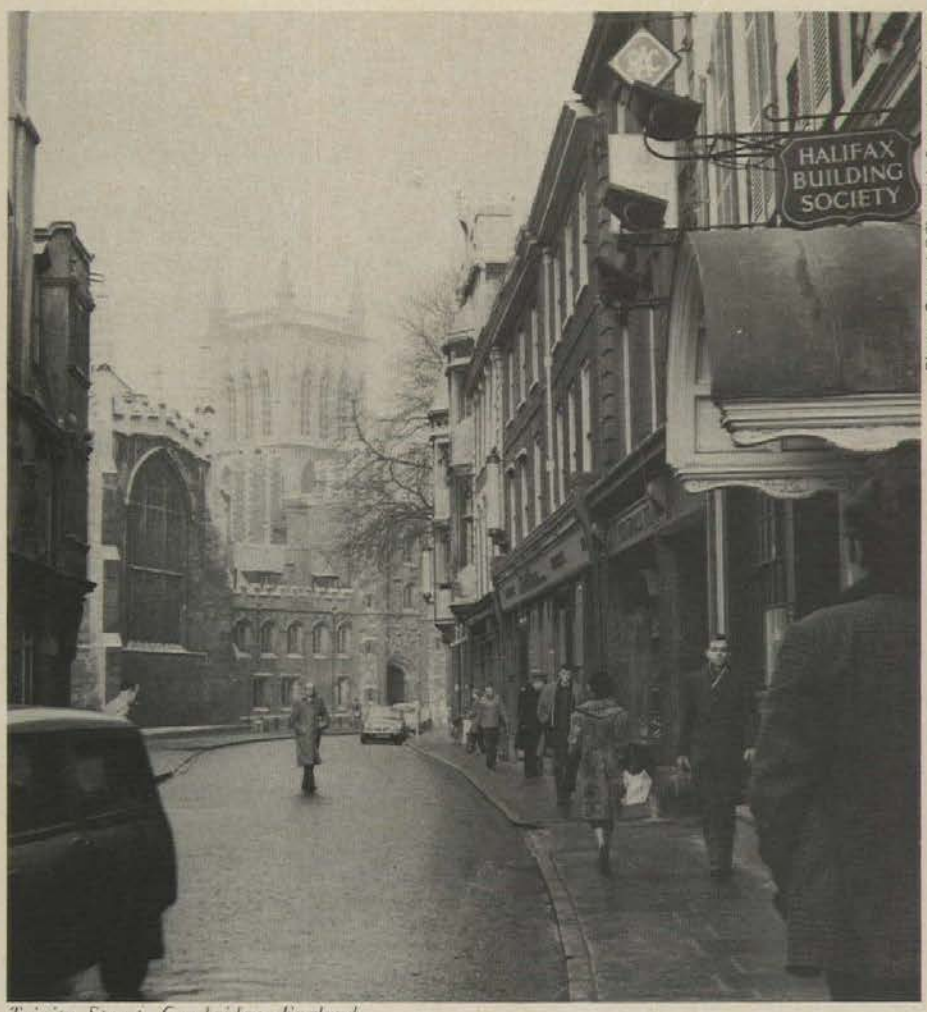


Photo: Central Office of Information, London

Trinity Street, Cambridge, England.

"Environments in which the rules are the same but the quality of the environment is different."

we are able to close our eyes a bit and produce flying bedsteads. The first functional thing is usually very ugly, but it works; and you've got to prove that it works before you can get the architect to give you a respectable form for it.

VOICE: Then form is added on?

MARCH: No, I didn't mean added on. I think an architect ought to be able to develop and create something that works.

NORBERG-SCHULZ: How about Palladio's theater in Vicenza? Did he hear about Place des Vosges?

MARCH: I don't know. Palladio put a roof over a Roman theater, perhaps.

ALEXANDER: In any case, we shouldn't bicker about whether architects invent things or whether other people invent them. Most architects are concerned with the problem of inventing new forms and that means inventing new relations and they are simply trying to do this. Under present conditions, however, they are forced to do that at the same time they actually put up buildings. This is not the best way to inject new relations into the culture at large. It often happens that great architects, like Wright and Corbusier, have attempted serious innovations in their buildings and they're copied entirely for the wrong reasons. If an innovation is embodied in a real building, and then it is photographed and copied, you've got to ask **what** is being copied. Is the significant relation going to get injected into the rule system as a whole? If the wrong things are copied, the building was just a one-off job and it may be years before someone identifies the important relation again.

NORBERG-SCHULZ: Architects are always trying new inventions at the wrong moment, if I understand you correctly, or else they are always going wild. If you now want to divide our general task into obeying the rules and breaking the rules on certain occasions, who decides when it is the right occasion to break the rules? If you can tell me, a simple architect, it would make my work much easier.

ALEXANDER: I'm not trying to make a dogmatic statement about that. It's probably a matter of personal judgment. I'm just trying to separate the two activities very clearly. For instance, take the Park Hill apartment project in Sheffield. In it, there are a number of new relations: the Y-shaped joint, three distinct kinds of levels inside the building, each with a characteristic and different relation to the outside, 10-ft wide corridors that change from side to side as you go down the building, doors clustered in fours, and one or two others. Now each one of these relations is either there for a good reason or it's not. If it is, it's worth repeating. It's possible that some are there for very local circumstances; possibly one of the three different levels has to do with the slope of the site. Any time one specifies a relation, one must specify the conditions under which it is appropriate, and why. If that were clearly and separately said, then the fact that a demonstration of these relations has been built at the same time the relations were invented is all to the good. They ought to be separated conceptually, because then people could come back at them and say, look, the Y-shaped knuckle seems a bit off. Is it important what angle it should have, or doesn't it really matter? And this could be discussed, and maybe it will turn out it should be a four-way joint, or a five-way, or perhaps as much as daylight permits. Under these circumstances, we'd begin to get a mature attitude in the design profession and the evolution of relations in the environment would begin to grow progressively instead of the architect each time throwing himself into the task as though he were starting from zero.

NORBERG-SCHULZ: You said that we could never reject a building, that we had no criteria for doing that. Haven't you just explained criteria for accepting or rejecting a building?

ALEXANDER: I didn't say we couldn't reject a building because we have no criteria. I said it's because buildings are too complicated. Relations should be isolated and examined one at a time, because you can't criticize them all at once.

NORBERG-SCHULZ: How would you isolate one relation in a building? Even in your example of the front versus the back garden, you said that maybe you weren't giving the right reasons for why people persist in wanting the house back off the street. Perhaps it is not possible to get clear, defined, exact relations. Perhaps in the very simple cases there is still some choice between reasons. Some people like flowers, and others just don't.

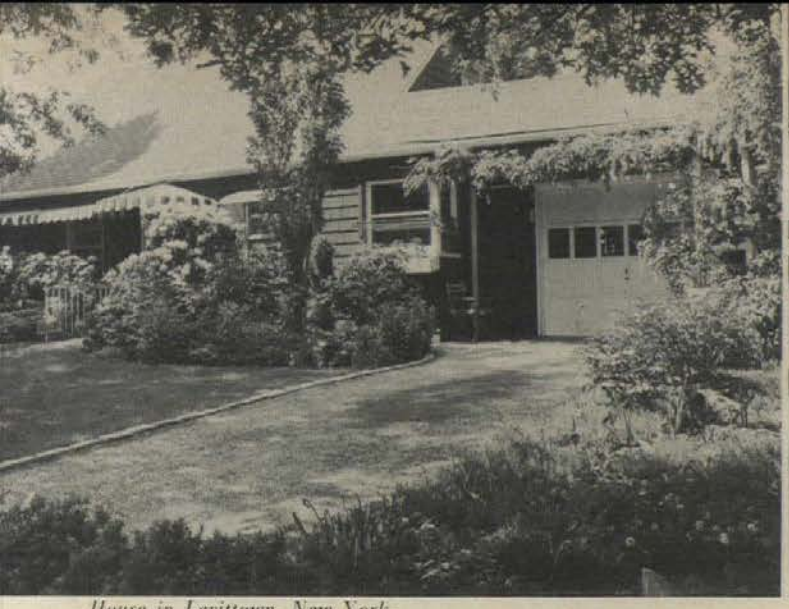
Architecture Versus Social Patterns

MARCH: I agree. And Park Hill worries me for somewhat the same reasons. One is the Popper analogy: He tries to draw a very definite difference between the physical sciences and the social sciences. In the physical sciences, one can expect that nature will reveal itself fairly simply and that you can therefore make very simple hypotheses about how it's working. Then you test those and see how it comes out. Nature won't look down and say, Aha, now they've found me out so I will change the rules. Society, unfortunately, isn't like this. It's likely that society will say, well, here's somebody who's telling us what to do so we'll do the opposite. And this is what worries me about Park Hill. You say that Jack Linn [architect of Park Hill] formulated the problem clearly. Corbu said you must formulate the problem clearly and the solution will follow. I just don't believe that we can ever formulate the problem clearly.

Photo: Central Office of Information, London

The Boardwalk, Crawley New Town, England.

"Cambridge is a very different place from, say, Crawley New Town."



House in Levittown, New York.

A pedestrian deck at Park Hill.

Photo: Central Office of Information, London

"The houses have been changed, not like Park Hill where everyone has just 1′-6″ of self-expression."

ALEXANDER: I didn't say we could formulate the problem clearly. I do think we can identify relations and rules.

MARCH: An example of what I mean is Levittown, which I prefer to Park Hill because it has a certain kind of "you come and get it" quality about it. The GI's took it and made it something of their own. Park Hill, on the other hand, simply seems to fix a distinct social pattern concretely into a building.

VOICE: What are some of the ways Levittown permits freedom of action?

MARCH: Dobriner [**Class in Suburbia,** by D.M. Dobriner] has done a study on Levittown over a 10-year period. When it started, it was desolate — the same kinds of houses and carports. An homogeneous society of GI's, more or less all the same age and from the same income and class backgrounds, moved in. Ten years later, the society is heterogeneous: There are definite factions; the political situation is pretty hot over education; there is a Catholic-Protestant split — things like that. The houses have even changed: Bits and pieces have been added, the brick or stone is out on asphalt rolls; they are strongly differentiated — not like the pathetic little bit of linoleum that appears outside the doors of Park Hill where everyone has just 1′-6″ of self-expression before you reach the public way.

WILSON: That isn't really an interesting distinction because you're talking about patterns of desirable existence lived by two different tribes. What sort of choice do those in Sheffield lack because they don't have four site positions for the car? What you're implying is that a form at Sheffield was invented and people have rejected it. But Levittown is a swinging situation for one tribe and Park Hill is another swinging situation for another tribe. Most of us have built housing that wasn't swinging for any tribe.

VOICE: The people who live in those places are prisoners.

MARCH: Architects and planners are responsible for making us prisoners more than we need to be by trying to tidy up the environment, but the things that are alive are very often not tidy. Levittown was not tidy, and people protested about that "monstrous eyesore on the landscape," as well as "agricultural country ruined."

ALEXANDER: To answer your basic objection that it is impossible to identify the problem specifically, I repeat that I've only been drawing an analogy between design and what Popper said about science. Of course, we as architects can't put up propositions that state matters of fact and subject them to tests, like scientists. The testing would be slightly different. What the innovative designer must test by observation and discussion with people is: Does this relation, as described and specified, resolve a conflict between tendencies that can be shown to exist in people, economic structures, or larger institutions. It doesn't make sense to say that relations themselves can be tested, but you can find out whether certain specific tendencies exist in people. They can be discovered by observing what people actually do.

One thing that should be mentioned is the architect's fee structure [laughter]. A serious matter. The invention of new relations is an extremely expensive business; it takes months and months of painstaking work to come up with one or two. If you recognize the colossal number of relations that need modification and improvement, you realize that within the normal fee structure architects just don't have the opportunity because of money to do this job properly. Incidentally, although the two examples I've given have been of small-scale relations, smallness is not a characteristic of them. Some deal in miles instead of feet.

WILSON: Do you claim that your ideas about rules and relations constitute an out-and-out functionalism?

ALEXANDER: Right. If the environment doesn't get this kind of treatment, it's not going to be all right, and since it can't be done within the existing fee structure we'd better work out another way. It means that some people will be paid for designs that aren't going to be built just once, but hundreds and hundreds of times over, because they'll be injected into the relation system and then adopted by many other builders.

To sum up: The critical issue is not whether you give certain work to architects or not, but whether new relations become imbedded in people's minds — people at large. If people want buildings with certain characteristics and they develop an idea of what these buildings should look like, they'll get them. They'll go and demand them. At the University of California, as we begin to build up complexes of relations, we shall go onto the national TV network and explain why certain forms are necessary — forms that do not exist now. One thing I've found in my short experience with architecture is that people at large are incredibly willing to understand the consequences of functional thinking. Architects are sometimes unwilling to, but people at large are always willing. They understand it, it's wonderful, they love it; they really see the point of it because it has to do with their lives. They are the people who have been carrying the images of what the environment should look like in the past; it's just at this present period that the responsibility for the environment has been taken away from them and put in the hands of a small profession. I'm convinced that people at large are willing and anxious to carry this responsibility again **in their heads.** The population as a whole will become the carriers of the relation structure that determines our environment. That's the way I intend to work.