The Measurable and the Unmeasurable or
From Form to Design to Existence

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Summary

This article discusses the architectural design process from two sides of the spectrum: the formal exercises of experts and the participatory process involving users. The "place" of the full-scale-modelling laboratory at the Federal Institute of Technology in Lausanne is then assessed with respect to this spectrum.

It may seem that activities in a full-scale laboratory are closer to the participation process than to formal exercises. However, activities of the full-scale laboratory in Lausanne may best be situated around the middle of the design process. It is clearly within the realm of the measurable (since each construction can easily be measured.) Yet, it does not quite correspond to the real building; it remains an abstraction, a model. And in this quality of abstraction lies the potential to give form to the unmeasurable. It is a tool which allows a transformation of the unmeasurable aspects of an idea into the unmeasurable of existence.

Résumé

Cet article discute le processus d'élaboration d'un projet à partir de deux points de vue: les exercices formels pratiqués par les experts et le processus de participation dans lequel les usagers sont impliqués. Il tentera ensuite de définir la "place" du laboratoire échelle nature de l'Ecole Polytechnique Fédérale de Lausanne.

Il peut sembler que les activités d'un laboratoire échelle 1:1 soient plus proches du processus de participation que des exercices formels. Et pourtant nous pensons que les activités du laboratoire dans lequel nous travaillons relèvent d'une position qui pourrait se situer vers le milieu du processus d'élaboration d'un projet. En tant que tel, ses activités sont à l'évidence mesurables (puisque chaque construction peut être mesurée). Mais les simulations ne correspondent pas tout à fait à un bâtiment réel; elles demeurent abstraction, modèle. Et c'est cette qualité abstraite qui contient la possibilité de donner forme à ce qui n'est pas mesurable. Il s'agit d'un outil qui permet la transformation des aspects non-mesurables d'une idée vers le non-mesurable de l'existence.

1. The Design Process

> "A great building must, in my opinion, begin with the unmeasurable, must go through the measurable in the process of design, but must again in the end be unmeasurable. The design, the making of things, is a measurable act. (...)
>
> What is unmeasurable is the psychic spirit. The psyche is expressed by feeling, and also by thought, and I believe it will always remain unmeasurable.(...)
>
> To accomplish a building you must start in the unmeasurable and go through the measurable. It is the only way you can build, the only way you can bring the building into being - it is through the measurable. You must follow the laws, but in the end, when the building becomes part of living, it must evoke unmeasurable qualities. The design phase involving quantities of brick, methods of construction and engineering is over, and the spirit of the building's existence takes over." (Kahn, 1930, 11)

This marvellous description by Louis Kahn of the steps (or jumps) which have to be undertaken within a design process gives us the opportunity to point out several qualities that are characteristic of this process:

1) The unmeasurable within the realm of thoughts cannot be directly transformed into the unmeasurable of a building.

    The transformation of expectations, thoughts, ideas, wishes, into a real, built structure needs many transformations involving various steps and even jumps.

    In developing a project one is confronted with incommensurable qualities. There are steps (or jumps) needed to bring the unmeasurable over into a measurable plan - and, through building it, these measurable quantities of the plan have to become qualities of an edifice, i.e. dimensions that are able to express the unmeasurable of existence.

    These steps are not linear and one is not the consequence of the other. They are different by nature and incommensurable. If you succeed in one step you have NO guarantee of making a successful transformation to the next one.

    It is furthermore not possible to leap over some steps. For a good project and a good building one has to take all of those steps into consideration.

2) The first sketch, as an immediate expression of the inspired mind, is not of the same kind and not comparable to the unmeasurable qualities evoked by an existing building.

    It is interesting to hear what Louis Kahn considers a good drawing. He discusses the sketches by Auguste Rodin:

    > "The drawings this great sculptor made took form WITH HIS EYE on the final results IN STONE. Although working with seemingly sloppy washes and careless lines, he was always thinking in terms of his chisel and hammer. They are great drawings because they embody the hidden potentialities OF HIS MEDIUM." (Kahn, 1930, 11)

An inspiring drawing is no guarantee that the building will be inspiring. The mystery of the unmeasurable can easily get lost in the transition from thought to existence within reality.

The design process continuously involves the risk that qualities will be forgotten and lost. A wealth of ideas in the realm of thoughts has to be transformed into qualities that really exist in a building.

Fortunately, Louis Kahn himself formulated the essential steps in the development of one of his projects.
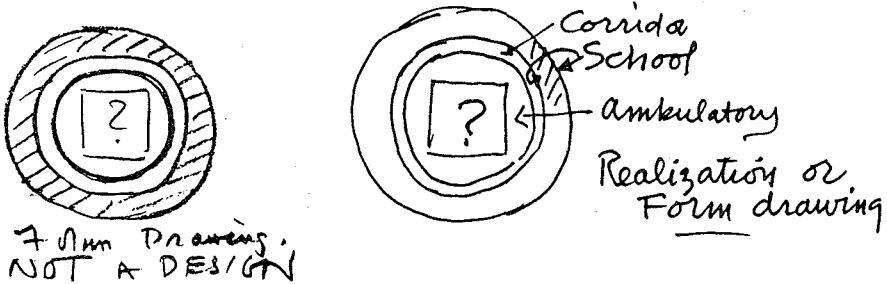
2. Example: Unitarian Church in Rochester, N.Y./USA 1958-1969

Louis I. Kahn explained:

"I drew a diagram, which I believe served as the Form drawing of the church and, of course, was not meant to be a suggested design.

FIRST UNITARIAN CHURCH AND SCHOOL
ROCHESTER, NY   1958–1969

I made a square centre in which I placed a question mark. Let us say I meant it to be the sanctuary. This I encircled with an ambulatory for those who did not want to go into the sanctuary. Around the ambulatory I drew a corridor which belonged to an outer circle enclosing a space, the school. It was clear that the School, which gives rise to Question, became the wall which surrounds Question. This was the form expression of the church, not the design.
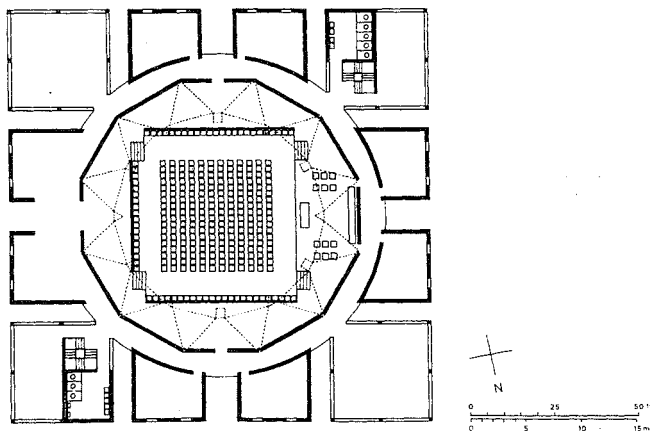
My first design solution was very rigid. It was a completely symmetrical square. The building provided for the schoolrooms around the periphery; the corners were emphasized by larger masses. The space in the centre of the square harboured the sanctuary and the ambulatory. This design closely resembled the diagram, and everyone liked it until the particular interests of every committee member began to eat away at the rigid geometry.

At one stage of discussion, some even insisted that the sanctuary be separated entirely from the school. I said fine, let's put it that way, and I put the sanctuary in one place and connected it up with a very neat little connector to the school.
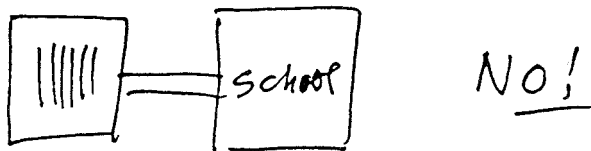

(The precedent of this scheme is clearly the Unitarian Church of Frank Lloyd Wright at Oak Park near Chicago)

Soon everyone realized that the coffee hour after the ceremony brought several related rooms next to the sanctuary, which, when alone, were too awkwardly self-satisfying and caused the duplication of these rooms in the separated school block.
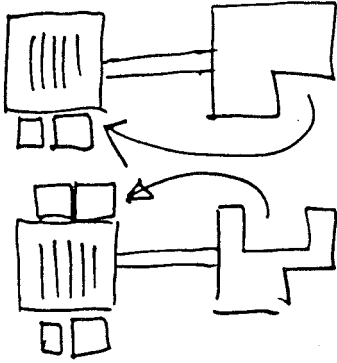
Test of the Validity of Form

Also, the schoolrooms, when separated, lost their use for religious and intellectual purposes, and, like a stream, they all came back around to the sanctuary.
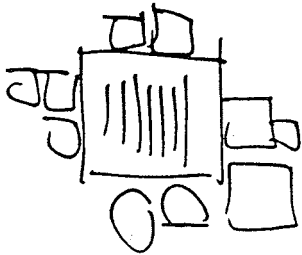
Design resulting from circumstantial demands

It is the role of design to adjust to the circumstantial. So the final design does not correspond to the first design, but the form held.»(Kahn, 1969, 90)
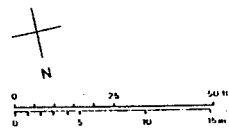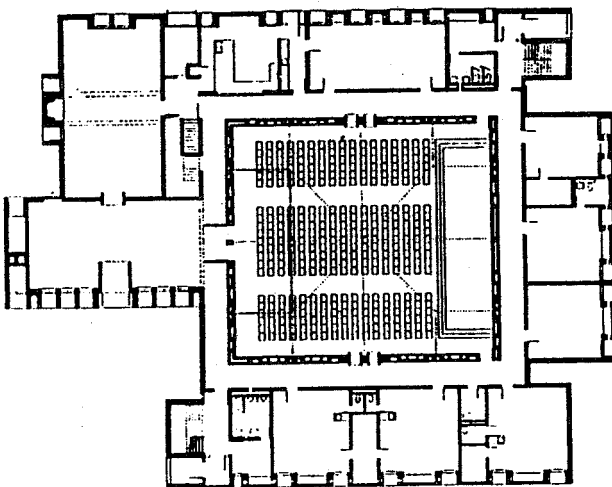
Louis I. Kahn begins "with the unmeasurable". In the process of design he develops his first sketch «through the measurable». And the building itself is "again in the end (..) unmeasurable."

But not all the architects have Kahn's capacity to deal with these problems. There are some who try to manage the whole of the process from idea to construction, others who intentionally concentrate on one specific aspect within the whole process. They rationalize their approach by saying that they are determined to understand the nature of architecture more profoundly. In concentrating their stimulating vigour on one aspect, they expect to achieve a deeper understanding of the essence of architecture. With their approach, they make a great effort to come closer to what architecture embodies.

3. On One Side of the Spectrum:
The Form Exercises of the Experts

As an architect, I am used to reading plans. I can imagine the rooms if I see plans and sections, and if, in addition, I can look at elevations, I can imagine the building as a whole. Naturally a model helps me achieve a much easier and better understanding.

If I look at plans, sections or elevations of projects or buildings by Peter Eisenman, I am lost. I must confess that my imagination falls short. I am not capable of visualizing the building. It seems that this was not Peter Eisenman's intention:

«The House El Even Odd is an axonometric object» (Eisenman, 1980, 98).

The house is shaped and at the same time deformed in such a way that its roof and oblique corners form a net of lines and edges that produce the well known image of the axonometric drawing of a cube. It is Peter Eisenman's intention that the real object, by reversing «the natural order of things», looks like what ought, by convention, to be its image.

«It explores the conditions of representation reading in architecture. As such it is concerned with the limits of the discipline of architecture.» (Eisenman, 1980, 80)

Eisenman's work demonstrates the priority given to representation over existence and reality.

Peter Eisenman:
House El Even Odd, Project 1980

Ebene 2 / Level 2   Ebene 3 / Level 3   Dachebene / Roof Level
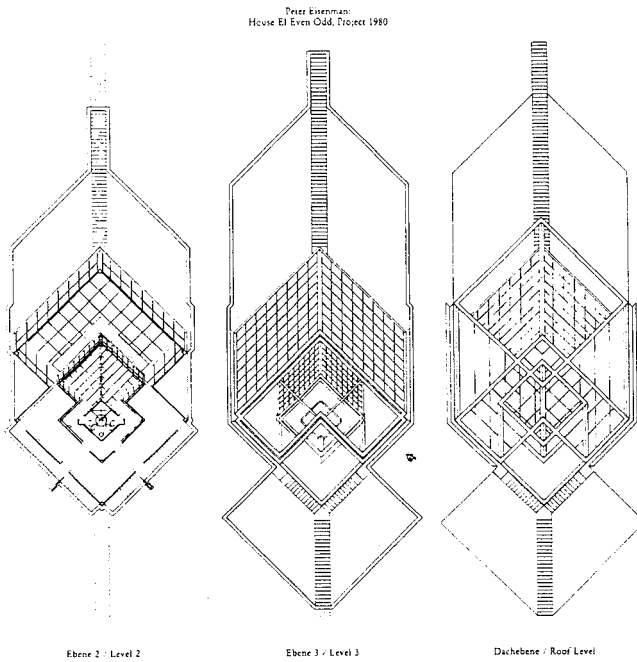
Looking at buildings of the period that Eisenman called «Cardboard Architecture» you are not certain to see trickery within a model or a real building. Eisenman himself asked: «Is this a building or is this a model?» (Eisenman, 1975)
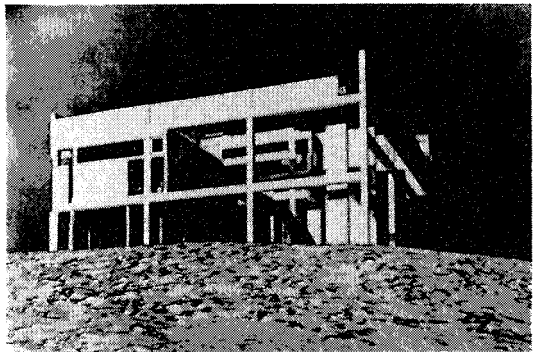
One could argue that «architecture has let itself be seduced by its own image.» (Reichlin, 1981). But this is less a problem of architecture than the problem of an architect who takes his belly-button as the centre of architecture and of the whole world.

Eisenman's first projects look like models, but also they are evidently not thought of in terms of life and existence. To live in these houses you have to adjust the model to the circumstantial which, unfortunately, disfigures the ideal model. Life is real and rarely ideal.

Bruno Reichlin reports:

> "Peter Eisenman, at a (..) lecture in Munich (1980), amused himself by showing the damage caused to his works by time. What can be funnier to a paradoxical mind like his than a theoretical construction (it is better to say: a constructed, built-up theory) that goes mouldy. The abstractness of the materials and of the colour saves the object from the overfullness - emotional, psychological and subjective - of the concrete, from the banal evidence of things as they are, and transforms it into an object of priviledged knowledge. Filiberto Menna, writing on 'The analytical line of modern art' (Menna, 1975), is right when he says that 'what matters is not only the work in itself, its formal value, but the intellectual process which the work sets off in the mind of the observer'." (Reichlin, 1981, 62-63)

Nonetheless, I would like to admit again that I have difficulties in understanding the intellectual process which that "object of priviledged knowledge" should set off. The tools of the design process begin to take on a life of their own and have, finally, a goal in themselves.

Most architects with a special interest for tools and in particular for drawings see architecture as something much bigger and wider than the built work. This is a view we can agree with. But we cannot support the idea that one should remain within the realm of the drawing only. The inherent incompleteness of the real building cannot be reason enough to refuse to build it and to live in it.

One other architect who has a greater impact through his thinking on architecture than through his constructions is John Hejduk, the dean of the Cooper Union School of Art and Architecture in New York City. But, at least, he refuses to build his theory.

The seductive power of his "Diamond-House-Project" (1967) lies to a large extent in the way it is represented.
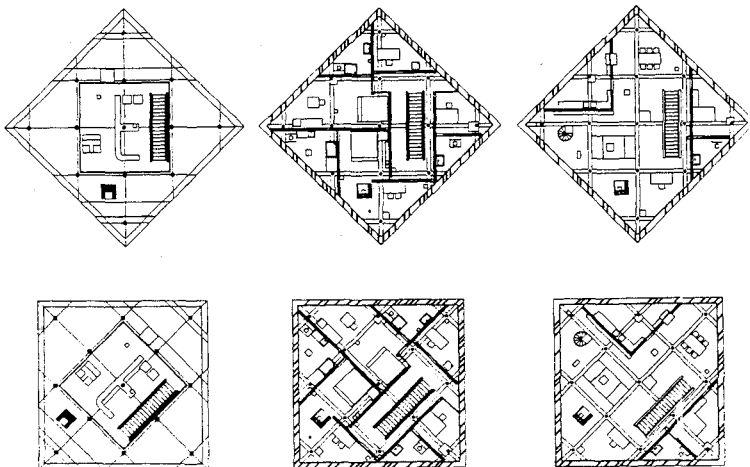
"When a diamond form in plan is projected by isometric it becomes a square. (...) The converse has been in existence and use, that is, the square drawn in isometric which becomes a diamond.

When a square form in plan is drawn in isometric it appears to the eye as a three-dimensional projection. When more than one floor plan is projected in isometric, it builds up quite naturally and still appears as a three-dimensional representation. When the diamond is drawn in isometric and has a plan of more than one floor, a very special phenomenon occurs. The forms appear two-dimensional; the stories overlap each other in a primary two-dimensional vision. The forms tip forward in isometric, towards the picture plane; they are three-dimensional drawings, yet a stronger reading of two-dimensionality predominates." (Hejduk, 1969)

The object of his work, in essence, is not the construction or the building, but the possibilities of representation within the development of architectural inventions. Hejduk's projects

"are the result of a search into generating principles of form and space in architecture. There is an attempt to understand certain essences in regard to an architectural commitment with the hope of expanding a vocabulary. (...) A liberation of mind and hand becomes possible which perhaps leads to certain transformations and visions of form regarding space." (Hejduk, 1969)

4. On the Other Side of the Spectrum: The Participation of the User

Every building is at a specific place and is part of the culture at a specific epoch. It is part of an existence and it has to prove its value in everyday life.

Therefore, it seems obvious that the inhabitants themselves know best how a dwelling has to be organized and what it should look like. They can enjoy it or they can have to suffer the consequences of their decisions. One would like to avoid the experts' authoritarian approach towards the inhabitants. These have to find their own way; they should develop the expression of their own life-style and shape their close environment.

This sounds fine, but the world (and also the users' world) is not as good as it should be. My experience with participatory processes have not been as enjoyable and sound as one could expect.

Let me detail some aspects:

- I had to defend the interests of unknowing future neighbours against the often outlandish demands of aggressive inhabitants. The louder they spoke, the more egocentric were their demands. They had no common responsibility but a sort of first come - first served mentality.

  In the common discussions at the beginning of the whole (time-consuming) process only a few people expressed clearly their demands. When we started with the construction and they had to commit themselves, most of these "participants" left the co-operation.

- Another problem is one of cost. Nowadays, construction is too expensive to allow many individual wishes. In this type of project, one has to build as cheap as possible, and this is possible only through repetition of

building elements. In a co-operative process, one has to find the common frame or structure that will allow individuals to undertake adjustments on their own.

-   We were often confronted with demands which were not possible within the given limits: as cheap as possible and near to public transportation; near the city and in direct contact to green spaces; big rooms for every child and low cost; close to a school and a shopping centre but no traffic noise. Dreams, wishes and reality did not come together, and we often had the impression that participants blamed us for not making their dreams come true.

-   It is not easy to work with a group of people to create an unity. Everyone has their own definition as to what is necessary and beautiful. Their reference is fashion, on the one hand, and nostalgic tradition on the other. What comes out is a sort of Disneyland with Main Street, Frontierland, Tomorrowland, and Cinderella's Castle.

-   The architect cannot be held responsible on his own for coordinating the users' housing designs into a site plan and making the documents for the building permit. For such a mission one does not have to study architecture for 4 to 5 years at a university.

-   As an architect, one cannot withdraw from the responsibility for the whole of the environment, the community and the place. There is no excuse, such as, "the individual's wishes were predominant." In this case the dictatorship of experts would only be replaced by the dictatorship of the laymen and this is in no way preferable.

It is not my intention to pretend that the participatory process is of no use at all. On the contrary, each project needs a "test of validity".

However, within a process of participation, the expert has to be able to explain the essence of his design and "to adjust it to the circumstances". He must find means, tools and ways to explain it to laymen, so that they are able to understand and to imagine the concrete building. The expert must listen to their demands and incorporate them in his proposal.

We are thus confronted with two aspects in the development of a project:

There are experts, dealing with the aspects of form, the "generating principles to produce forms", and the creation of an architectural vocabulary. They are interested in the general themes of architecture, without paying any attention to specific users' requirements nor to the appropriateness of a building in everyday life.

On the other hand we have to confront users' participation. Here, the interest is focussed on the specific, individual requirements. The architect tries to arrange nicely individuals demands, at the risk of forgetting more general aspects of architecture.

5. What is the Contribution of the Full-Scale-Modelling Laboratory ?

It seems that a Full-Scale Laboratory is closer to the participation process than to formal exercises. The layman can build his rooms without specific knowledge. He can push the walls, change openings, modify the relations between the rooms, etc. One can try to achieve reality as closely as possible, still knowing that one will not

succeed completely. The plastic-block-walls are different in material from brick walls, the ceiling is different, the surrounding, the view, etc.

The models in a full-scale laboratory are very useful when dimensions are the main problem, i.e.when planning a room within a hospital or in a home for the elderly. But a construction in a full scale laboratory will always remain a model and, as such, distant from reality. This is true for all the tools an architect uses to represent a building. Still, in a full-scale model, one can walk around a space, and this is not the case for most other architectural representations. Nonetheless, one will not inhabit this space. After all, we are still dealing with a model.

One could experience this as a disadvantage and try to overcome it. In developing our exercises we went in another direction. We followed Louis Kahn who said about the use of any architectural tool:

"There is no value in trying to imitate exactly." (Kahn, 1930)

At first we just accepted the difference between the full-scale-model and reality. Later we even welcomed this difference because it helped us demonstrate our conviction that only concepts and architectural principles are transferable and transformable into different stages and forms.

We also feel sure that one should not teach a specific architectural language, or a special approach. The student must learn to develop concepts and to work with architectural principles. He has to find different adequate solutions to one single problem rather than selecting one form. We summarize this view by stressing that we do not teach architecture, we teach the work of an architect.

We confront the students with quite distinct architectural themes, for instance, the organization of space. We choose examples where the principal approaches are evident and different, for instance, the free plan of Le Corbusier, the *Raumplan* of Adolf Loos and the spatial structure of Louis Kahn or Herman Hertzberger. First, the students have to understand the different characteristics of the given approaches and then they build their own version of an approach in the full-scale-laboratory.

The specific character of our laboratory and its equipment do not allow the students to copy the example chosen. They have to translate its principles into a configuration that can be constructed with the material provided by the laboratory. The content remains, the appearance changes. The fact that he cannot simulate encourages and forces the student to make interpretations, and in so doing, he begins to really understand the possibilities of a basic principle. He learns an architectural principle, but he also understands its qualities and is able to apply it in different situations.

One could claim that such an approach is only possible in a didactic situation with students. I would like to argue that it is also valuable in a participatory process with inhabitants. I am convinced that, in a participatory process, one has to come to an agreement at the general principles level and to give as much freedom as possible to individual arrangements. Therefore, the layman must be given a chance to recognize the potential of a basic organization, to discover what will be fixed and what will be left to the individual. In such an approach there is no fight between the expert and the individual. There is a search for a common base, a setting up of commonly agreed upon principles (Kahn would say the FORM) which then enables the architect to develop his design and give the inhabitant a structure into which he can integrate his individual wishes.

The difficulties that result from full-scale modelling arise when one uses this technique to approach reality. But modelling as an instrument has an outstanding potential for better understanding an architectural theme. I would thus state that our full-scale laboratory fits in within the middle of the design process. It is clearly within the realm of the measurable (each construction can easily be measured.) But it is not yet the real building; it remains an abstraction, a model. And in this quality of abstraction lies the potential to give form to the unmeasurable.

In the opinion of the LEA-team, this is the most important characteristic of our full-scale modelling laboratory. It is related to a problem which the full-scale laboratory shares with the computer simulation: it enables one to evoke an almost real image of the thing, but never the reality of the thing itself. But as opposed to computer simulation and to virtual reality, when using a full-scale-modelling approach, one does not try to imitate the real thing, one builds an abstraction. The quality of the abstraction is real. One can walk in and experience it in its quality of realness.

In the real 1:1 model it is possible to transform the unmeasurable of an idea into a measurable reality, which is not yet the reality of the building but which embodies, as an abstraction, its principal spatial qualities. It is a tool which allows the transformation of the unmeasurable aspects of an idea into the unmeasurable of existence.

This is one of the advantages of the full-scale-modelling approach, which no other tool can provide and which deserves to be developed.

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