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at turin, designed and  
built by Pier Luigi Nervi

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# Student Publications of the School of Design, North Carolina State College

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**THIS ISSUE . . .** The entire contents are taken from the proceedings of the Southeastern Regional Conference of the Association of Collegiate Schools of Architecture. The Conference was held at the School of Design in conjunction with the dedication of the School of Design's new building, Brooks Hall. John W. Shirley, Dean of Faculty, N. C. State College in his address "Mind and Machines" set the theme of the three day meeting: "In education we must go through a new renaissance, with all its struggle, disillusionment, and opportunity. We must survey our knowledge, reassess the accuracy or truth of what we know, and see if we are truly using for man's good the knowledge that we have. As we must build our society on the level that the machine will permit, so must we build our education on the mental levels that the human mind will permit. We must stop training men to be machines and must make men of them. Through all stages of education from the pre-school to the post-doctoral, we must emphasize the enlargement of the human quality of judgment. We all know that even an Einstein or a Planck uses but a miniscule portion of the potentiality of the human brain. Yet we have barely scratched the surface in developing the human mind; in fact much of education appears to be discouragement of thought rather than stimulation of judgment or the seeking of new values. We must rebuild our education on the level that the machine can raise us to, without forcing man to duplicate the functions most effectively left to machines. We must teach principles instead of rote facts at the elementary level; and interrelations of principles at higher levels of education. We must recognize that we are training men for the future, not duplicating men of the past.

We must recognize that true genius and creative imagination are the products of the individual, and we must protect individualism wherever we are fortunate enough to find it. We must not be afraid to give our students problems that we cannot solve. They may not solve them, either, but the attempt should lead them further than we have gone. We must ourselves use mind and not machine — judgment and creative imagination, and not sense and recall — in our educational planning and in our teaching. We must be as bold and imaginative in education as our limited capabilities will permit. Only in this way will we have education designed to train men — men who can create the machine, use the machine, and master the machine."

## ON RELATIONS BETWEEN CONSTRUCTION PROCESSES AND ARCHITECTURE

Pier Luigi Nervi

I believe it is of the greatest importance at the present stage of architectural development, to try to clarify the complex relations between the esthetic aspects and the structural and constructional requirements of a building.

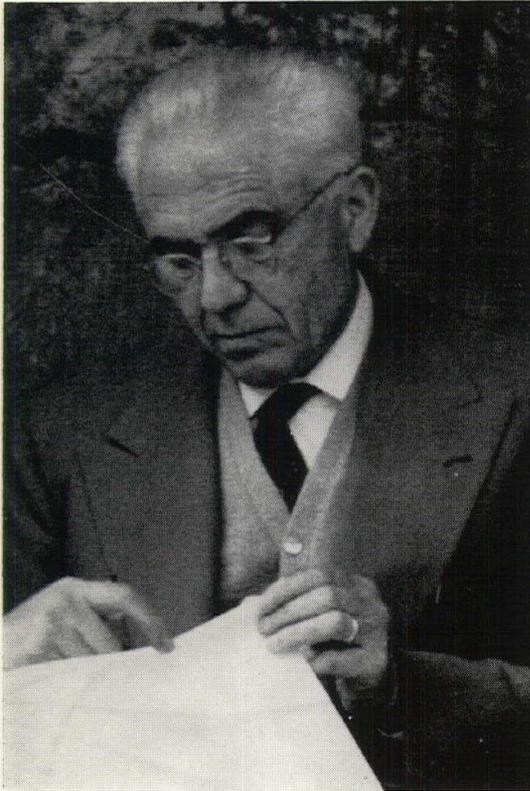
It is obvious that engineering and the mental make-up produced by engineering training do not suffice to create architecture. But it is just as obvious that without the realizing techniques of engineering any architectural conception is as nonexistent as an unwritten poem in the mind of the poet.

Engineering offers an almost unlimited source of static, constructional and functional possibilities which, even if incapable of architectural expression, may be transformed into expressive architectural realizations when vivified by a sense of composition, harmony of proportion and care of details.

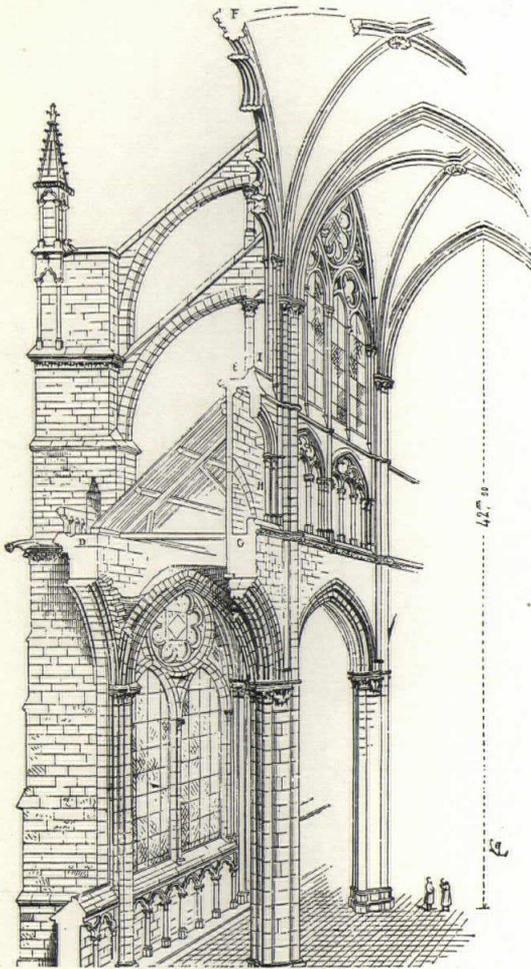
I believe it possible to establish an analogy between architecture and music which helps clarify the relations between Engineering and Architecture. It is true that the most complete musical ensemble with the best instruments and the best players, cannot create a musical masterpiece, but it is also true that without the power and the sound complexity of the instruments of a modern orchestra and without a corresponding capable performance the most gifted musical genius will appear dumb or at least incapable of expression.

It is easy to imagine the new levels of composition reached by the composers of the past because of the invention and successive improvements of the string instruments, and what new fields could be opened today if new sound producing means were suddenly discovered.

Architecture today finds itself in the same situation in which music was when it abandoned old-fashioned and inefficient musical instruments for the actual orchestral ensembles.



Pier Luigi Nervi—Engineer and builder, Professor of Engineering at the University of Rome.



The first example of prototype architecture - The Gothics had found a perfect solution for a given problem that we would repeat today if we were confronted with the same problem. Loads are carried from roof to floor in the most perfect way. There is not a better example of integration of stability, construction and aesthetics.

The flying buttress must work in compression because it is made out of stone. The top is straight because it transmits the forces, the bottom is curved because it supports the dead load of the material. The best engineer of today will not be able to find a better solution.

Steel, reinforced concrete and the structural theories which allow their rational use are the new instruments at the disposal of the architect, who will be able to compose with them, architectural symphonies more complex and complete than any built from the origins of time to date.

The many aspects of the radical changes in construction techniques which have taken place in the last one hundred years can be synthesized in the following essential points:

1) The birth and development of the theory of structures which allows us to design with sufficient accuracy and ample safety the greatest variety of structures.

2) The ample use of materials with high strength, such as steel and concrete, due to fundamental industrial developments in the field of materials.

3) The novelty and magnificence of the new architectural themes advanced by our industrial development, our new and fast means of communications (factories, railroad and highway bridges, airports, hangars) and required by social progress (large theatres and movie houses, stadiums, new urbanization plans).

4) The increasing importance of economic factors.

Perhaps the most important among these points is the first: a widespread knowledge of theory of structures had popularized and democratized the essence of the structural problem and freed the architect from schemes and solutions which were a result of a slow evolutionary process.

It would be quite difficult to reconstruct today the long series of thoughts, observations and unsuccessful trials which guided the builders of the past, and to recreate the mental processes that brought to them so many genial intuitions.

Try to compare the height of genius, the power of intuition, the unending meditations and the courage required by Brunelleschi, to conceive and to supervise the construction of the dome of S. Maria del Fiore in Florence with the easiness with which we may verify the stability of much more complex structures today. The great freedom of structural invention available to us today will then be quite obvious.

Even in the recent past the discovery of a new structural system was a slow process due to the work of a few builders and of a few exceptionally gifted architects. Today, instead,

any modest designer may tackle a structural problem of unprecedented nature and may solve it with relative ease and safety.

At the same time, we cannot help but notice the negative aspects of this democratization of structural knowledge, which is so valuable from a practical standpoint.

The great structures of the past, and among them the Gothic cathedral more than any other, express in their details and in their unity the superior intelligence, the almost miraculous structural sensitivity, the almost unimaginable sum of experience and of executive ability of their creators and builders.

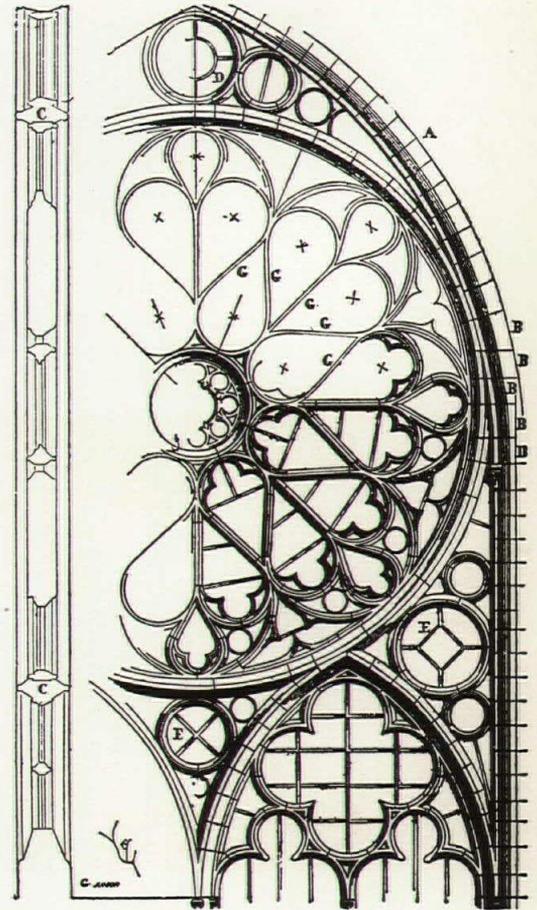
In these masterpieces all the structural and construction problems are joined in a perfect synthesis. In these realizations it is impossible to separate artistic inspiration from technical ideas: these matured through the intuitions and meditations of exceptional minds and reached the nobility of art.

The facility with which we can now tackle a large number of structural problems and the cold objectivity of the methods of analysis, as compared with intuitive mental processes, have unavoidably lowered the level of our realizations.

I am afraid that humanity will not be able to repeat the technical and architectural miracle of the great Gothic cathedrals.

But forgetting the point I have just made, it is doubtful that the possibility of theoretical analysis of a variety of structural systems has enriched during the last few decades the instruments of our architectural symphonies much more than the construction experience and the superior intelligence of generations of builders have done during the last few centuries. Although it may be difficult to establish the reasons for the coincidence, it is important to notice that the birth of theory of structures, fruit of purely mathematical speculations, took place at a time when our industrial development gave us new materials well adapted to daring structural schemes, and at a time when our technical and social progress proposed new structural themes requiring that theoretical knowledge and those materials.

It is difficult to imagine what realizations would have



The erection of this huge rose window is a daring constructional problem. If destroyed, the builder of today will be incapable of rebuilding it. These drawings show an attitude, a moral conduct that I feel is the same one that we must follow today; construction, stability and aesthetics are unified in a whole.

been produced by means of the same materials in a medieval society in which the only themes of structural importance were the church and the castle.

During the last one hundred years all the factors which directly or indirectly influenced construction have been harmoniously directed towards a new architecture which has no real connection with the past.

Nothing is more absurd or sterile than to try to maintain artificially structural schemes and architectural forms of a past which has nothing in common with the present or with the foreseeable future.

On the basis of these considerations, it may be well to ask ourselves what will be the direction of this new architecture.

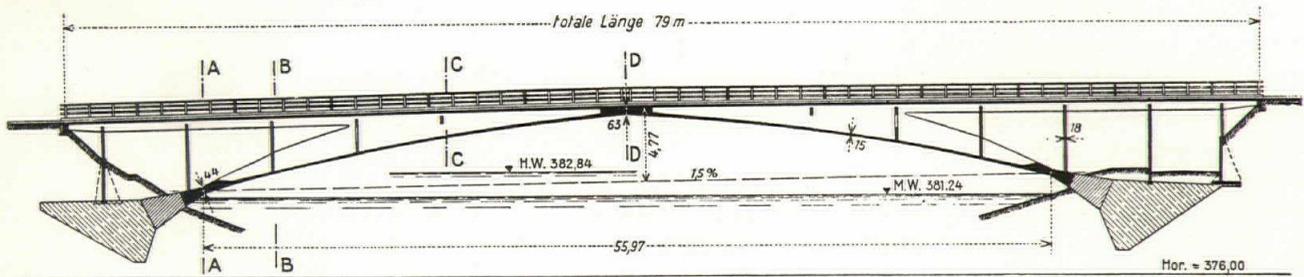
It is easy to observe that the increasing importance of the structural aspects of the new themes (like long-span bridges, great halls, stadiums, railroads, maritime and air terminals, large factories and large office and storage buildings) require a strict adherence to what I like to call "statical truth" in order to obtain economical and constructionally possible solutions.

It is obvious that any structure of large dimensions is strictly limited by structural requirements, both in its form and in its resisting skeleton.

The freedom of form of the head of a window or the arch of a cloister, the structural elements of the architecture of the past, disappear completely when we are confronted with large dimensions or exceptionally heavy loads. A bridge more than 100' in span has already a limited number of solutions; if the span is over 150', the number of possible



In the field of construction we can verify the same phenomena, mainly in structures of great magnitude. Bridges - solutions with purity. There are no superfluous or arbitrary elements. No human will can change these shapes.



bridge over the Arve near Vessey-Geneve by Maillort

solutions decreases and there may be only one or two solutions left when the span is over 300'. The profile of an arch-bridge of more than 300' or 400' span cannot differ much from the curve of the resultant pressures of the permanent load. Therefore its shape will be very near the shape of a parabola.

Every important piece of construction will therefore have a tendency to express, more and more, the structural scheme which determines it. Actually an honest expression of such a scheme will be architecturally eloquent as shown by the photographs of some typical bridges.

Numerous realizations in other technical fields help us in the creation of a new esthetic sentiment which necessarily is deeply felt in architecture. Airplanes, ships, automobiles and machines cannot help obeying the strictest functional truths and the rigorous laws of statics and dynamics which leave us little room for fantastic creations.

In the eighteenth century a complete freedom of form and of decorative detail allowed the builder of sailing ships and of horse-drawn carriages the creation of beautiful looking vessels and magnificent berlines. These products were in complete esthetic accord with the architecture, the interior decoration and the fashions of the time.

The shapes of our airplanes, our ships and our automobiles are rapidly approaching standard shapes of minimum resistance. In a few years they will have to adhere to theoretical hydro-dynamic or aero-dynamic shapes, whatever the esthetic feelings of their builders. The following photographs will show, better than I can do in words, how airplanes, ships and automobiles have gradually abandoned the freedom of form typical of their infancy to reach uniform, standard shapes imposed by physical laws.

I believe that such functional results will influence in the long run even those smaller buildings which otherwise could still conserve, because of their limited dimensions, a certain amount of freedom.

It is therefore foreseeable that both because of the direct influence of the structural problems of large structures and because of the direct influence of other technical and mechanical realizations and, finally, because of the ever-



Looking at these racing cars we can observe how a need, namely speed, has produced a prototype that cannot be changed.



This airplane has a beauty that is independent of human will. Being products of physical needs, these forms cannot be changed unless we modify speed and other conditions. This is the same conduct that guided the Gothic solutions.

increasing influence of economic factors, the entire architecture of the future will be directed towards truth; that is, towards a more truthful style. All superfluous decoration and all sculptural characteristics will be abandoned even if they constitute one of the most striking aspects of the architecture of the recent past.

This new direction which tomorrow's architecture must inevitably take (unless all the fundamental technical aspects of our new culture should suddenly be revolutionized) will not lead us necessarily to cold and standard architectural expressions. First of all, the structural forms of great works are in themselves rich and beautiful but, moreover, we must create architectural expressions of minor importance which are at the same time functionally and economically correct, free of useless and often vulgar decorations, made interesting by harmonious relations of volumes and surfaces and enriched by color and by the refinement of details.

Moreover, entire fields of architecture will always be free from the cold and purely technical requirements of structuralism. For example, the solution of urbanistic problems in the residential sections of our cities can still be quite free and may express in the serene joy of their green areas the need for romanticism and poetry which, I hope, will still be felt by future generations.

After so many changes due to the varying sensibilities and to the social conditions of humanity in the past, we now see the birth of this new "style of truth" which is imposed by the techniques of mechanics and of large structures and which will invade all other fields of human activity.

All over the world, new structures are being built today which more or less consciously express this style of truth. I believe that in the near future this style will flourish consciously everywhere.

Because of this, it is most necessary to point out a danger which menaces the field of architecture during this traditional period and whose gravity is evidenced by numerous architectural realizations of the recent past. I have in mind the danger of fake structuralism; that is, of a structuralism which instead of being born of the natural materialization of structural and construction requirements, originates in a



Constructional and static solution - the ribs follow the lines of principal bending moments. The elegance of these lines is not due to the merit of the designer but is a merit of the structure itself.

presumed formal structuralism which may not correspond at all to the statical reality of the problem. In other words, I am referring to the danger of structures being generated by the exterior appearance rather than by the inner essence of the statical problem.

The change-over from the traditional constructional themes and their solutions to those of today has been too fast and has taken place during an interval of time shorter than the professional life of a designer. The substance of the new structural and architectural possibilities did not have time to mature and to become deeply understood. Hence, the new solutions reveal the absence of a deep conviction and, because of this, are often inexpressive and anti-architectural. We must denounce the danger of an academic structuralism which may be even more damnable than the old academic decorativism.

The answer to this question lies in the preparation of the designer and in his understanding of the statical problem. Therefore the problem is essentially an educational one and must be solved by the faculties of architecture.

One of the worst mistakes we can make is to assume that the architect may get by with a knowledge of structures which is inferior to the knowledge of a structural engineer. To be able to invent and proportion even approximately the new and grandiose structural schemes required by the architectural themes of today, the architect must have an understanding of structural concepts so deep and well integrated as to transform these concepts—originally based on physical premises, mathematical theorems and experimental data—into a unique synthesis and into an intuitive and spontaneous sensibility.

A complex structure cannot be designed starting from the formulas and mathematical developments of the theory of structures. These formulas and developments will become necessary during the second phase of design in order to proportion the elements of the structure. It is the capacity to feel a structure in an intuitive way, as one feels a ratio of volumes or a color relation, which represents the indispensable basis for structural design.

A serious structural training of the new architect is fundamental for the development of the architecture of tomorrow.

Panel Discussion:      **PRESENT ISSUES IN DESIGN**

**MODERATOR:**

**GEORGE BOAS**, Head of the Department of Philosophy at Johns Hopkins University; past president of the American Philosophical Society; aesthetician, critic and author of *A PRIMER FOR CRITICS*, *WINGLESS PEGASUS* and articles in journals; editor of *Courbet* and the *Naturalistic Movement and Romanticism in America*.

**GARRETT ECKBO**, Landscape architect and member of the firm of Eckbo, Royston and Williams in San Francisco and Los Angeles; Visiting Critic at the University of Southern California; and author of a great number of articles as well as the book, *LANDSCAPE FOR LIVING*.

**MARIO G. SALVADORI**, Professor of Civil Engineering at Columbia University; Fellow of the New York Academy of Science; author of several books and a great many papers on the subjects of applied mechanics, engineering mathematics and new structural techniques.

**PIER LUIGI NERVI**, engineer and Professor of Engineering at the University of Rome; consultant engineer for the UNESCO building in Paris; author of the books, *SCIENZA O ARTE DEL COSTRUIRE?* and *CONSTRUIRE CORRETTAMENTE*.

**JOSE LUIS SERT**, Dean of the Graduate School of Design at Harvard University; architect and city-planner including practice in Spain, South America and this country; active in the affairs of the Congress Internationaux d'Architecture Moderne; author of *CAN OUR CITIES SURVIVE?* and many articles.

**Boas:**

There are several points in Mr. Nervi's address, "On The Relations Between Construction Progress and Architecture," which provoked the liveliest discussion and about which I am sure even the members of the panel would care to raise some points. I should like to run through some of those matters which I think are of particular interest to the students of architecture, as well as to practicing architects and to students of the philosophy of art, so that they may be clearer to you at the very outset and so that the panelists may then direct their discussion to those points.

One of the outstanding matters which Mr. Nervi emphasized this morning it seems to me, would be

that curious interaction which exists between the laws or rules of an art, like architecture, and the creative imagination of the artist. That the philosopher of art who would maintain that the architect's contribution to architecture is alone important would be telling but half the truth, and a person who would maintain that an architect was simply confining all of his activities to obeying the laws of his science or of his technology would also be telling but half the truth. That, on the contrary, is the creative imagination as fortified by thorough knowledge of science and technology which are involved and that the technology and science are enlightened, and you might say, illuminated by the creative imagination of the artist.

In the second place, Mr. Nervi emphasized a point of great value that one oftentimes overlooks, I think. That is the liberating effect of having a technique to follow, a science to guide you; that your imagination as an architect, or any other type of artist, is not confined to the point of sterility by obeying the rule, but on the contrary, operating with-in that rule, finds a general liberation for his artistic intuitions.

Mr. Nervi brought up the four important factors that must be considered in dealing with modern constructions, which I shan't go into at length. But he particularly pointed out the influence of the new organization of society upon architecture and upon the creation of architectural forms. That is the need which we have today for a type of building which we didn't need in previous ages, like these huge railroad stations, airports, etc. In an age of speed—new types of construction are required, which were not required before, and this will eventually lead to the formation of certain standard types of construction which he believes will become permanent. When these pure types are evolved in accordance with the laws of statics in the case of architecture, but I suppose it would be in accordance with any scientific laws which may be in control of your art, then a new kind of form is developed through physical necessity. You will recall Mr. Nervi's beautiful slides of the bridges, of the airplanes, the ships, which were evolved by the designer obeying in the greatest humility the scientific laws which were required and the purpose for which he was building these things, and instead of resisting the law he obeyed it and in obeying it found he was creating the new form which would become permanent later on.

Finally, Mr. Nervi, in answer to questions which have been raised, dwelt upon the point that there was always a certain margin of freedom left to the architect or any other type of artist, but was not quite sure how you were going to make this margin precise. That is, he gave the example, you may recall the automobile—in which the design of the machine was controlled by the purpose for which it was being built and by the laws of speed, just as the shape of the airplane is determined, in part

at any rate, by the laws of aerodynamics. The color of the machine might be left to the designer. This seemed to some of you as being a poor consolation indeed.

Finally, I think there was one point, and Mr. Nervi agrees with me, that should be brought out again, and that was this curious historical fact that when a new form is developed in obedience to certain scientific and technological principles, the people who observe it see its beauty automatically. Each of these points has been dwelt upon by me for the purpose of raising debatable questions about which I know many of you in the audience have points which you want to raise and as I'm sure do some of my colleagues around this table.

I am going to turn first to Mr. Salvadori and see what he would like to say about these points.

I am not calling upon Mr. Nervi first for two reasons; one is that he is too modest to say anything and the other is that he says he agrees. When a man says he agrees and is too modest to add anything to it, I thought possibly that during the discussion he might be stimulated to raising certain counter objections of his own.

**Salvadori:**

I would like to make a point to you first. I am not sure that this morning it was made quite clear by either Mr. Nervi or myself that what Mr. Nervi was talking about essentially is what I call "limiting structures." That is, structures that go to the limit. When he said, "Everything then is dictated by the laws of nature and that of necessity, it will become a fundamental type," he had in mind those problems in which size is fundamental or in which speed reaches limits that makes it fundamental. I agree that he might be right in this case; that the laws of nature may dictate proto-types to be followed from now on.

Now, on the other hand, and this is Salvadori speaking now, I would like to say that I have a certain faith, inherent faith, in the human spirit and that I cannot foresee that at any time any of our actions, including the production of beautiful buildings or works of art, might be entirely dictated by the laws of nature. Even if you conceive of a bridge of a tremendous span, it is perfectly true

that as of the present day you must conceive of it as a suspension bridge. But within the field of suspension bridges, I think there is a little something left to the creative imagination of the man who designs the structure and that these little elements may eventually add up to something very beautiful and very different from another structure, just as large, just as true. And I use the word "true" in the Nervi sense, but quite different from the other, which you might also consider to be beautiful and true.

**Boas:**

This morning there was one type of architecture which wasn't mentioned and which I imagine, in my ignorance, has little to do with statics—that is landscape architecture. It occurred to me during the lunch hour how a landscape architect would react to this morning's discussion and consequently I have taken the liberty of suggesting that Mr. Eckbo enter the discussion at this particular moment.

**Eckbo:**

We have to look at any discussion of structures in terms of the effect on the general landscape, the quality of the general landscape. Buildings don't exist in a vacuum. They exist in a real world surrounded by things that have gone on before. The landscape is a continuous phenomenon. It is continuous from ocean to ocean. It doesn't have boundaries except in the legal sense. It only has obstacles, and also for each individual person, the landscape is a continuous experience from the time they are born until they die. In all their waking hours they are conscious of some kind of landscape around them. Each new building which is added to the landscape is, you might say, a new force. It has the potential for being a new force, sets up new relations, new tensions or contradictions.

The thinking of the landscape design process is a little different in this picture because the architect and the engineer produce central concepts, new concepts, which are more or less abstract new things in the world.

The function of the landscape process is to establish a relation between this new central force—if it is a building—and the site it is on, the space

immediately around it, and the local landscape that surrounds that site; so that the landscape process is concerned with continuity, with relations, and with connections. These all boil down in practice to the effort to organize and articulate space. This is thought of as having the same function as architecture has. I think ultimately the two of them have to merge into an art of space design which is a continuous art, which doesn't have boundaries, which doesn't produce isolated concepts that exist in a void, but are always related to what is around them.

**Boas:**

Should you care to elaborate on Mr. Nervi's point of the influence of, for instance, botanical laws, horticulture and all of that, on what the imagination of the landscape architect can do?

**Eckbo:**

I might just say that in the way we work, there are two primary sources of inspiration.

One is architecture and the other is nature, and the farther apart they get—that is, the more refined the technology, the more of a spread you have, the more elaborate or complicated the problem of setting up new relations becomes.

Of course there is a tendency, both on the part of architects and landscape architects, to minimize architecture and landscape, to say that we should be defenders of nature excusing the building and landscape.

But I think this is selling architecture short. You can't sell either of these sources of inspiration short. The vitality of the whole process of landscape design is precisely in constant effort to put these two forces together in a harmonious way.

**Boas:**

Now, we have heard from engineers, if that is not an insulting term, and we have heard from the landscape architect.

It is now my privilege to introduce a normal architect, who also teaches other people how to be architects.

Dean Sert, will you take the floor?

**Sert:**

I appreciate the qualification of "normal architect", because I think to be normal in an unbalanced

period like the one like we are living now is really a good quality.

One of the things we would like to see re-established in our city, in our physical environment as a whole, is the quality of balance—which implies a certain return towards the normal. It may sound very shocking to express one's self this way when we have people of the distinction of Mr. Nervi who have been working on the extraordinary. I think as you architects work you have to keep the extraordinary for the right occasion. If you look at architecture within the complex of the city or of the community, the majority of you in the majority of your work, let's say about ninety per cent, are going to have to build within a developed environment.

You cannot ignore that environment. I think many of the horrors we see around us today are due to the ignorance or the total overlooking of the surroundings of a building. We have a tendency to design indoors. We have great ambition to make a masterpiece out of every little building we are asked to design. And a series of little masterpieces make a horror when you add them up along the street side. That is what happens when you see the little hot dog stands along the roadside. The architects wanted to do something marvelous in engineering, and marvelous in design, striking in color, and all. Add them up and see what you get.

The work of the engineer is extremely important. The collaboration, from the very beginning of the project, with the engineer is extremely important. The architect should, if he considers building in an environment, have a sense of value. When you see one of these old medieval towns in Europe, and you walk along the streets, you see the cathedral which is a wonderful piece of engineering. It is so precisely because it sits contrasted against the environment of the modest houses surrounding it that do not pretend to be wonderful pieces of engineering. What happens there is that you really have, in one instance, a structure that is emphasized, a structure that is a limiting structure while all the others are not that at all.

If we had limiting structures put along the roadside like hot dog stands, it would be a horror. Our

environment has to have a gradation in a sense of values, the same as when you are composing music or composing a picture or mural. If you have everything with the same emphasis, with no accents, the whole picture or whole symphony becomes monotonous and impossible.

I often show to students a book recently published by Le Corbusier called *A Little House*. It was the story of a house he built for his mother on the lake of Geneva—one of his earliest works. It showed the nice little sketches and showed some pictures of the house and even showed the cracks in the house, the mistakes he had made in design. It was an artistic piece of work and it had a nice sentence in there: "There is a little wall and an opening in the wall and a wooden bench which is simply boards over two supports" And he calls that "reality in architecture" or "an architectural reality." That means that architecture can begin very low on the scale. It is not confined to sensational building or important structures. Architecture can be a simple wall around a very modest garden. Architecture is everywhere if you know how to give it the right spirit.

Now, the adversity with the great engineers, we are sometimes a little bit at odds. That is because the great engineers, because of their work, are very often like the very extraordinary doctor-specialists that are only interested in you if you are really a very important case and you are practically dying. If not, they don't look at you. And we architects have, of course, to deal with very important buildings but often we are condemned for the majority of our life to deal with very insignificant buildings. I think we should be aware of the significance of insignificant buildings when they come to form part of our physical environment. I think there should be exercises in modesty in the schools of architecture: where you don't build useless cantilevers when they are not called for; where you really have to build with simple means. Of course the engineers have a good laugh at that because they are aware of the cost of these things and they very often see the impossible things architects like us do when we design cantilevers that aren't called for and design a series of things that

are complicated structurally for a structure that doesn't require complication. They have a clearer sense of values than we have, but on the other hand, they are a little bit over on the side of the important building.

Always for them, the simplest example, as Mr. Salvadori mentioned, is a bridge. A bridge is a terrific structure which we wouldn't dare handle. There is a certain disparity between the position of the architect and the engineer. I believe the architect has to have a broader sense of his work as it affects life.

I am sorry I was not here for Mr. Nervi's speech, but I have seen quotes from it. He says there are buildings today for entirely new needs that did not exist a few years ago. It is true. As architects, we have to consider, have to design for entirely new needs—big railroad stations, exhibition halls, assemblies, etc. Big railroads, big bridges and big everything—but we also have to design for people who still or who should walk on their feet; who still have the same visual angle that the Egyptians had 2000 B.C., who still have the same optical and auditive system and the same human mechanism of man of the very earliest times.

So we shouldn't forget one thing or the other. We should take advantage of the new things. In a city, for instance, I see very distinct scales between design of buildings that are along the road that you are supposed to see at a certain speed if it is a speed road and what you would design when you calmly walk along a little pathway in a landscaped area where the things can have another scale, another feeling, another quality. There you can introduce texture that you could not appreciate or even see in other scales.

I think we have to say not that we have to adapt ourselves to the automobiles or elevators or the new machines such as helicopters but that we have to use these things for our benefit. They have to be in our cities because they give us better living; otherwise they would make no sense. They are a means not an end.

The roads are like an important sewage system. They are very beautiful, but yet of necessity they

have to be designed functionally from that principle that they can be beautiful.

So here you have something where people are moving on a certain speed a certain way, that requires a special design, a special massing, a special conception, and then you come out and you leave your car—and I hope that many people in the future will have to leave their cars in some place and will of course be prepared for that, and then walk. Once you walk, you need another completely different treatment of the space. And if we consider what we are doing, engineers and landscape architects and city planners and architects: we are shaping space. Everything we have has to be put to that end: to shape space. We have to shape space to get the best space we can for our material needs and for our spiritual needs so that we obtain a spiritual satisfaction, enjoyment, and a well-being out of the places we are building. I think the engineers have a wonderful place in the city. The landscape architect has also, but as an architect I would like to see the function of each classified exactly and placed where it belongs.

I do not believe that every building is an important structure. I think if it were, it would be unfortunate. I don't believe the structure in every building should be expressed. I think in other buildings it doesn't make much sense to express the structure very honestly outside. I think too many of us today think of a building in terms of a rectangle divided into an even number of spans and the number of spans divided into an even number of glass partitions or windows or brick walls or whatever it may be. I think that if this is repeated a hundred thousand times around our cities, it won't be a very very interesting or exciting visual element to see around us.

**Boas:**

I think now the clashes in opinion are pretty clear. If not, they will be made clearer in a moment when Mr. Salvadori takes the floor. Mr. Salvadori?

**Salvadori:**

I do agree entirely on the importance of space in what Dean Sert and Mr. Eckbo just said.

I would like to pick up the first quarrel on the role

of the engineer. You, (Dean Sert), seem to feel that the engineer only looks at a building that is very large. May I say the fault rests entirely with the "normal" architect. Because when the "normal" architect has got a small building to design, he does not think he needs the engineer and goes on all by himself and creates quite often a very lovely building—quite often a completely wrong, non-limiting structure. So my point is, please, do come to us even if you have just a little case of mumps, not only if you have a very bad cancer.

The second point I want to make is, I've heard Mr. Eckbo talk about landscape and I want to inject one thought which occurred to me the first time I went to Italy after the war and I travelled by plane. I was struck by the fundamental difference between the American landscape seen from above and the Italian landscape. The difference essentially being that the Italian landscape was made by God, with the help of man, and the American one seemed to be made by God at times with a little help and at times with just the opposite from man. The point I make is this—there are places in the world where the landscape has been worked upon for very many centuries and one wonders whether this large number of generations of little human beings—Tuscan peasants, Sicilian peasants and farmers were really aware of this architectural landscape problem or whether this purely casual construction in landscape just grew. It is very, very wonderful.

**Boas:**

What would you say to that, Mr. Eckbo?

**Eckbo:**

I don't have any formulas for how to produce this new landscape that we obviously need, in this country especially, and I don't know just what the relation is between this kind of unconscious design and generations of peasants or just how unconscious it is. I think the professionals have to get back towards understanding what it is that people search for that makes them produce that kind of a landscape in the older countries where they have lived close together for so long. Those are the kind of values we have to find, instead of producing these Buck Rogers landscapes as we tend to do on the

drawing board.

As far as God is concerned, there is the story of a man that stood outside of the gates of a large estate watching them move in big boxed trees. He said, "My, my, that is what God could do, if he had money!"

**Salvadori:**

I would like now to put together what Mr. Nervi said what Mr. Eckbo said and what Dean Sert said. Because I think that it is very easy at times to get very philosophical and to ignore some fundamental issues. We are all describing in glowing terms the limiting structure of the gothic cathedral which contrasts so beautifully with the little houses of the village. Well let's face it. Our social structure would not allow us to have people live in those houses because they are terrible to live in.

So the problem is not just to say we want a contrast. The point is how can we get contrast by having people live in decent homes and still contrast these little homes with the great structures built by Nervi.

**Sert:**

That's an easy one to answer, because I was referring to that example in something of another time. I think we could have an equivalence of values but translated into the problems of today. When you say that we couldn't permit people to live in those houses—naturally those houses lack sanitation, etc.; they were built according to the principles of the time, the difficulties of defence, protection, etc.

We must say, though, that the picture today is not so rosy and there are still many people in many parts of the world living quite as badly as that. In many of those beautiful Sicilian villages, the way they live today is not very far from the way those peasants lived in the middle ages. About the gradation of values, I think that translated into modern terms the same differences of quality and importance can exist.

What I'm thinking of, is that when an environment is planned in a balanced way these differences of values should exist. While today there is chaos and of course there is no difference in values and everything is confusion. I would like nothing better than to see a beautiful community, large or

small, where you would have housing in balanced units, where there would be beautiful courts landscaped by good landscape architects and where you would have a beautiful road system that wouldn't annoy but would serve the community and where you would have monuments or bigger buildings that could be designed by Mr. Nervi.

That would be very beautiful. There would then be this gradation of scale, this relationship of values. I think then what would be important is that the structures of the small houses (and don't misinterpret me), which would be carefully calculated by the engineers, of course, would be appropriate structures for those kinds of houses. The question of appropriateness is very important in our work. Many things may be very beautiful and very interesting, but if they are not appropriate they don't belong. So you have certain structures that are appropriate to cover big spaces and are not appropriate for small houses and other structures that on the contrary wouldn't fit the big spaces and are appropriate for smaller structures. I think that's where the engineer can help a lot if the engineer has a sense of what the architect wants to do. He really is a collaborator and helps with the work of the architect. It's a question of gradation of values and of putting everything where it really belongs.

**Boas:**

As a philosopher I always get uneasy when I hear about values. Maybe this is an evil conscience on my part, but it seems to me a terribly abstract term. Of course we're supposed to be able to deal with these abstract terms in philosophy, but I always feel out of place when they are brought in. I wonder if you would be willing to make that just a little more precise. What are these values that are supposed to be realized? For instance, take a group of houses, houses in an urban conglomeration serving some sort of purpose. In this case what do you mean by appropriate? Appropriate to what? Appropriate to the pocketbook? to the landscape? appropriate to the function which the house is supposed to serve? I don't want to be quarrelsome about it.

**Sert:**

No, I think it is a very good question. I would

say that it is appropriate to what is going to happen in those houses. People in those houses generally come back from work. They come to rest. They want to find a place that is appropriate for that particular function of having a certain privacy, being together with the family, being able to read a book, or being able to receive some friends. That would mean that the space has to serve not only the material means. Of course it has to be well ventilated or well heated etc., but it also has to give us a certain satisfaction because the proportions and the relationship of volumes and colors and textures are correct and pleasing. Also we should consider that since these houses are in the community, they are part of the neighborhood and in fact they should not clash with the neighbors house but, on the contrary, all together should build up into something bigger that reads as a unit and has a certain quality of unity and continuity running through it. Which unity and continuity is broken when you come out of that area of the town into a bigger space and they you find yourself faced with a beautiful structure that has a certain monumental quality and other qualities that would not belong to a private house. The values of that structure or the qualities that it has to have are different from the others.

**Salvadori:**

I would like to ask Mr. Nervi a question which is connected with what Dean Sert is talking about.

I was wondering whether Mr. Nervi could tell us how he feels about this talk of "limiting structures" and "non-limiting structures." Does he feel there is an essential difference in the approach of the engineer?

**Boas:**

Mr. Nervi will reply in Italian. Mr. Salvadori will translate.

**Salvadori:**

The answer is a complex one, but it is also quite clear.

Mr. Nervi feels that there could be a very substantial difference between the large and the small structure, (can we use these simplifying terms?—) and the essential difference would be that the small structure, not being limited by the laws of physics,

will have less of a necessity for following these laws and would therefore give more freedom, even if it is a superficial freedom, I mean a freedom on the surface, to the architect and the designer. Mr. Nervi feels that this freedom is not going to be used. He feels that the impact of these prototypes of these fundamentally correct solutions for the large problems is going to create a style, is going to influence people psychologically and esthetically—not only the designers but all people to such an extent that even the smaller structures are going to be designed as if they were under the necessary laws which dictated the larger ones. As an example, the fact that all through the history of mankind, the esthetic feelings of people have been homogenous in a variety of fields as Mr. Nervi pointed out in the ships of the seventeenth and eighteenth centuries.

It is also true that people were driving carriages which looked like the ships and were dressed and had furniture that looked a bit like the ships you saw this morning. So that Mr. Nervi infers that although the freedom would be there for the smaller structures, he is afraid that this freedom would not be used because of this apparently pervading influence in style dictated by the necessity of physical laws.

**Boas:**

Wasn't it that which gave us streamlined coffee pots and flatirons?

**Salvadori:**

That's right.

**Boas:**

Do you approve of this as a principle of design?

**Salvadori:**

Mr. Nervi is not approving of this! (This is not I speaking; this is he) Mr. Nervi has never approved of this, but he says it seems to be a fatal consequence.

**Boas:**

I thought this morning I was getting too pessimistic, but apparently I wasn't pessimistic enough.

**Salvadori:**

The point is a very important one, and it is a long one. Mr. Nervi noticed that this being carried away—this fact of being carried away by an in-

fluence which is actually foreign to the problem at hand, as you would call foreign the influence of aerodynamics on coffee pots. He noticed that when Marco Polo came back from China every man of wealth in Venice soon wanted something Chinese in his home. You'll find that there are eras when all of a sudden we Westerners become conscious of Egypt and we like to build things as if we were Egyptians. Mr. Nervi says that the point is: our culture is going to create a larger and larger number of objects which are dictated by the physical laws of nature. That the objects which are now being dictated by the laws of nature are going to be even more dictated. Our bridges will be larger, the speeds of our aeroplanes are going to be greater, etc.

For the first time in history we have an influence which has not come from another part of the earth, it is not just a fashion. It is something which comes from the fundamental laws of nature and am I to conceive that while this fashion is being created by the laws of nature on these very large objects—at the same time all the other objects about which there would be freedom are going to be designed in a style which would correspond to the rococo or liberty style? It is true that during the Renaissance in Italy we built things imitating the Greeks. After a while we stopped. But here is something—the laws of nature—which will never stop being. Gravity will be gravity and supersonic speed is something which will not change.

Therefore, Mr. Nervi thinks that although there will be a freedom, the history of mankind seems to point to the fact that these fashions, particularly when they are really unavoidable, are not really fashions. They come from a very fundamental law. They will influence all the other objects, and he does not believe, therefore, that we shall have as much freedom as our friends the architects might like to feel there might be.

**Boas:**

Do you have a comment to make on that Dean Sert?

**Sert:**

I wouldn't like to be misinterpreted. When I spoke before about the difference in the scale of structure or in the quality of structure, and the

difference in the importance of accentuating the structure as against not accentuating it, I never meant that the non-accentuation of structure was supposed to be then the whole thing taken over by some kind of decorative or superimposed style. But I will give you an example that I think is very clear. While the Renaissance and the so called "historic" styles were developing, the world also developed in greater numbers an architecture that can be called the anonymous architecture of the people which is an extraordinary good architecture of common sense and has nothing superimposed as the renaissance palaces have. So that what Mr. Nervi said before is very concise. It is something that happens as a human phenomena. There is the influence of the great things, especially today with newspapers and sensational headlines and movies and television. We still have more influence of that type but I would like to see a sort of reestablishment of values, maybe because I'm thinking of the city in terms of beauty, of a unified and a harmonious community, where the accents would be in their place where they belong. And I know that is a very good example of the streamlined or the aerodynamic coffee pot. There's also exactly the negation of the spirit of the engineer or the architect—those people who are called designers or custom designers or something like that (I don't want to disqualify anybody here for in all professions there are good and bad), but they come from another side of the picture. I don't think any conscious architect would design an aerodynamic coffee pot because he knows that makes no sense.

So this side influence for me or influences of style are true as Mr. Nervi said, but in this moment I think that they are of secondary importance because I think that will be less and less possible as people begin to have a greater knowledge of the real value of structure and a greater knowledge of the natural forces that govern our world and being more conscious of all these things. I think these mistakes will not be so frequent as they have been in the past. I do think that the majority of people are today conscious of how disagreeable and how lacking in unity is that which results along our roadsides. The people are conscious of that, the majority of people

have good common sense and I think they are reacting.

**Salvadori:**

Mr. Nervi would like to answer this.

It is not an answer; it's a statement and it's a widening of the statement Mr. Nervi made this morning, which I think is very important. He feels there is an essential difference between the fashion which came through imitation of other peoples—the "Chinese" style, the Renaissance, etc. and what he has labeled this morning as "the style of truth," because he feels that these forms come from the laws of nature. He specifically mentioned the aerodynamic shapes of an airplane which are beautiful in themselves. They are abstract beauties and as such they have a permanent value which you cannot attach to the fashions taken from other times and other peoples.

And then he notices that we are the first generation to see these forms. He said these forms perhaps existed; (and I think he has in mind an almost Platonian statement) the forms may have existed, but we human beings had never seen them before. Now we do love trees; we do love a beautiful garden, but we have been seeing trees and gardens and mountains for centuries, and for thousands of years, and we therefore have a consciousness of this kind of beauty. This other is an entirely new kind of beauty which we are facing for the first time and of which we are slowly becoming conscious. If it is true that this abstract beauty has the essence of eternal beauty then Mr. Nervi does not see that the two phenomena of fashion coming from other peoples and other times, and a fashion which comes from a new sense of the pure—he almost called it "moral" or "spiritual" beauty—have anything in common. This makes me feel that perhaps we are going to see this kind of fashion and he implies that this is not a bad fashion.

**Boas:**

The time is getting on gentlemen. I should like as soon as possible to put the discussion to the floor, but before doing so, is there anything you'd like to say Mr. Eckbo?

**Eckbo:**

I think it is certainly true that there are new

forms being brought into the world by an industrial, technologically developed society. This just makes a more complicated problem in the general landscape also a much richer potential. It makes unprecedented problems. I think this whole thing we are talking about, about trying to design the general landscape without specific boundaries, is a new field of design that is beyond the normal operation of architects, of landscape architects, or engineers that falls between them and planning, city planning, regional planning, which is largely a kind of diagrammatic abstract operation. And I don't think any of us has the final answer. We can only try to project what the problems are in terms of having to relate three-dimensional space back to the individual citizen each time and to relate them back to the way he ordinarily lives. He doesn't live in airplanes at jet propelled speeds. He lives an ordinary kind of life where he gets up in the morning and goes to work and comes home again at night. And that is the environment that is most important to most people.

I would say that landscape architects are involved with structural engineering sometimes. You really might say that the civil engineer to us is what the structural engineer is to the architect, (I don't think that's a true analogy—it is a superficial analogy) and civil engineers and the city planners between them tend to freeze land use patterns before anybody thinks three-dimensional or physical design is important. They freeze the subdivision of the land; they freeze utility lines highway patterns, etc, in a way which I think is largely responsible for the sterile quality of a lot of the American landscape. So then the architects and the landscape architects come along and they have to strain their ingenuity to try to pull something out of this desert which has been created and we have to get back to realizing that the fundamental elements of the human landscape are buildings, trees, ground forms, streets or roads, open spaces—and an open space that's an asphalt parking lot is not the same thing as a green open space—and just explore what this means. And one other thing you mentioned—the Italian landscape, or the English landscape, in the same way that we have been told about the natural landscape for a long time—as though it were always perfect.

But we know that nature varies.

Nature is sometimes very beautiful, sometimes just pleasant, sometimes ugly and I think the same thing applies to any kind of historical landscape, that there are good parts and bad parts, and it is our function through a rational process to find out why the good parts are good and how they are important to us just as we have to analyze nature.

**Boas:**

Before we turn to Mr. Sert, perhaps you would like to say something.

**Salvadori:**

I have a very quick and personal question that I want to ask. Is there an ugly tree?

**Eckbo:**

Yes.

**Salvadori:**

That's good to know.

**Boas:**

Could you name a few of them?

**Salvadori:**

Mr. Nervi says the only ugly tree he knows is a sick tree, but if the tree is not sick, it is beautiful.

**Eckbo:**

That's what I was going to say. Trees don't—the proto-type of a given kind of tree—seldom exists exactly in nature that is. A pine tree, let's say, there are scientific ways of identifying it, but it grows in different ways, depending on where it is growing,—a mountain, a forest or the seashore, and it is the function of the power of human decision to rearrange vegetation so as to get the most out of the vegetation and sometimes trees are ugly if they are in the wrong place, if they are crowding each other. All sorts of things can happen to trees, like when they get old and begin to deteriorate. This comes out very commonly in the problem of which tree should be cut on a given site—how should we treat this tree or is it worth all the money it will take to protect it when we have to change the grade or something like that.

**Boas:**

Now Dean Sert, will you enter the conversation, before we turn over the discussion to the audience?  
**Sert:**

Well in the last point that they have taken—just

to take the last one about the ugly or the beautiful tree—I agree that theoretically there isn't an ugly tree if it is a healthy tree. When you go to a nursery to choose a tree, you choose a particular one because you like it better than the others. And no doubt (I'm not talking about species of trees) within the same kind of tree you will find some that are very beautiful in shape and other are not.

It is a question again of proportions, and I think the same element with different proportions differently placed or differently related may make for beauty or for lack of it.

**Salvadori:**

Why do we have to discuss so much whether a tree is ugly or not: we say that a man can be very ugly—that's obvious—just look at us.

**Eckbo:**

May I say one thing?

**Boas:**

By all means.

**Eckbo:**

That's like the common saying that a weed is a plant in the wrong place.

**Boas:**

Well I, of course, am only here to preside, and a presiding officer or chairman should sit in his chair, but I have a lot of things to say about several of these points; however, I have the privilege of having a whole hour tomorrow. ("Tradition and Innovation in Art", page 23) That's a commercial.

Now, may I have questions from the floor?

**Question:**

*Mr. Eckbo in one of his final statements made a comment about the imposition on the land form and on our surroundings by city planners' freezing land values or setting up arbitrary divisions of land. I wonder if you will make some comment about that, Dean Sert, either pro or con?*

**Sert:**

I agree with Mr. Eckbo.

That generally has been the violation of nature all through the majority of cases. Again you can't make an absolute statement. We are not talking about landscape arrangements. We have a bigger concept now. A certain landscape which transforms that landscape may still be a good plan, may still

be a good piece of architecture, and even a good piece of landscape but on the other hand, in the majority of cases there is a useless destruction of nature.

I have always tried in my plans when there is a site to keep the majority of existing factors, if possible, as they are; build around them, accentuate them, and develop them, not destroy them. That is my approach, and that approach for me is better than the other one.

But it all depends on what you are trying to do. You can't try to respect nature and do a bad job also, that is if you understand it. It depends greatly on what you do. I think that the healthiest approach (and in this I agree with what Mr. Nervi has said before) is to move toward nature, because nature as an element is congenial and everything that is in the world was created and we are part of it and it is congenial to our own system. If we take the opposite road we very generally go against ourselves.

**Question:**

*I would like to direct a question to Dr. Boas.*

*Considering what we have been talking about with you in class—the definition of beauty and what form is and what is formless—how can you say that you believe actually there is an ugly tree? What would you classify as an ugly tree?*

**Boas:**

You see these gentlemen have not taken my course. In fact the number of people who ever have taken this course of mine in relation to the population of the world is very, very small and in fact so small as to be trivial. Furthermore, may I point out that one of my colleagues once wrote to me and said, "Is it possible that you believe in the incredible things you write?"

Let me say that I have been discussing the emergence of objects of art and the beautiful things out of obsolete utility. My own feeling is that a thing becomes beautiful when it ceases to be useful. This of course is heresy and I realize it perfectly well and it would require a great deal of time to make the point clear.

Now, what my own feelings are about beauty and ugliness of trees, human beings, books, works of art

or anything else is an entirely different story. I would have to go to a psychoanalyst to find out why I think there are ugly trees. Not only have I not gone to one, but I haven't got the money to go to one, and in the third place, I would be terrified of the results. Since I want to go to my grave in peace, in the few years that are left to me I am not going to try to find out why I think certain things are beautiful and certain things are ugly—that's just my personal reaction to them.

But of course, when I was discussing the matter with the class, I was discussing it from a general point of view of cultural anthropology rather than from the personal point of view.

This does not answer your question, and I have no intentions of trying to do so.

**Salvadori:**

I am highly amused by the statements of our chairman, and I wonder whether a definition of culture, which I have heard for years, actually goes back to him. Culture in this definition is the assemblage of all the views which are of no value to you. And now I'm going to prove this—if you as a philosopher know all about Benedetto Croce that does not make you cultured. But if you know all about the stress in a beam, then you are cultured. That's very sad, and if I do know the stress in a beam—I am not cultured, but if I know Croce—I am cultured. So the definition is, whatever is of no use to anyone is culture in the opposite sense.

**Boas:**

Well that definition I can't claim though I would be very proud, if I could. I think the difference between your knowledge of Croce and mine—in so far as yours is culture and mine isn't—is as you quite rightly say—I can use it and need it in my business.

**Salvadori:**

You make money with it.

**Boas:**

I don't make much money, but what little money I make, I make it by knowing about people like Benedetto Croce.

**Question:**

*I'm addressing this to the panel, but principally Mr. Nervi, I think.*

*I feel that we engineers are not quite used to deal-*

*ing with these problems at the level we are on now. We have in our own work an easier way out—translating them into symbols which we know how to deal with. And therefore many of our judgments may be at fault because we do not realize that many of the statements happen to be booby traps. But I will say for instance—to draw conclusions as to limiting structures—I don't think it's wise to say that there are no such things on the earth in the terms of the materials we are using.*

*This is very important, because from all certain indications I can conceive a limiting structure out of cardboard, which is small, and also one of concrete, which is a lot larger. So when you translate it into reality, of course the magnitude of the structure itself is no measure whatsoever, and this argument becomes quite deep. Furthermore, what is more important in the present state of our technology: it is probably the first time technology has run away with us and we can do a lot more than what we need.*

*I am certain that a span which is much larger than what Mr. Nervi has had occasion to build could be built by him, if there was a need for it. That is somewhat different from what we had in the past. In the past we had to stretch ourselves to the limit and now we can do more than what we need. So therefore, some conclusions based on past experience become somewhat shaky. This raises a second argument which flows out of this—that is: because we are capable due to our highly technical and scientific experience to design these relatively limited structures in a way that they more or less satisfy natural laws. I do not feel that they become—that they ought to have a stronger influence on culture than other things. As a matter of fact, nature from the beginning was very adept at solving differential equations. We just learned that recently. I think the same abstract beauty that Mr. Nervi finds in an airplane, I can find in a pebble which was running down the river and which was formed by the same process of nature. And they are all the time just as natural, just as beautiful as the airplane. As a matter of fact, they are based on very similar mathematical relations. Except nature solved it with a different theory. So that I feel that arguments which*

are based on these concepts become somewhat shaky.

**Boas:**

Do you think Mr. Nervi would like to comment on that?

**Salvadori:**

The answer to this, although very tentative, seems to be that Mr. Nervi feels that the shape of a pebble does not have the quality of necessity and purity that an aerodynamic shape has, in fact, he says there is only one proper aerodynamic shape for an airplane or a jet or a rocket to go through space, and there are thousands of forms of pebbles.

Mr. Nervi feels that the question and answer he is giving involves problems of such an importance that if we could reach even a temporary agreement, some very essential conclusions could be drawn from this fact. He says that he has read somewhere, and he does not know whether this is true or not, that a certain automobile factory decided on the outer shape of the automobile by making a model out of soap and having water run on the soap. He says if you do that you are going to find that there is one and only one shape and not two million shapes of pebbles so he feels this is a unique form as contrasted to the infinite variety of forms that you can get in nature. That's the first point.

The second point is that he has performed a little psychological experiment. He has drawn the arch of a bridge using in one case a parabola or curve very near to the parabola and in the other case half an ellipse. And he has shown the two arches to people who knew nothing about structures and everyone says they liked better the parabolic arch.

Therefore, says Mr. Nervi, I think that in our subconscious mind whether at a very deep level or half up according to Freud, we must have an intuitive subconscious understanding of the laws of nature which make us decide that we like better one of these forms which corresponds to truth, according to physical law, as against forms which are not truthful according to physical law.

Hence he feels that this intuitive understanding, this subconscious feeling that this is right and that this is wrong, will have much more influence than the casual shape of a pebble.

**Question:**

*Mr. Salvadori; I wonder if the question last considered could be elaborated a little more in terms of Gestalt psychology? In other words the appropriateness or the exactness of the form of the function.*

**Boas:**

The question, Ladies and Gentlemen, is whether the beauty, let us say, of the form, couldn't be better explained in terms of Gestalt psychology which would involve the appropriateness of it. I think that is essentially what you are after.

**Salvadori:**

Well, you have had statements from the panel which both agree and entirely disagree with your viewpoint. I personally am inclined to feel the way you do. I think that what Mr. Nervi has brought up is this: symphony with nature. After all it is perfectly true that we admire a landscape; we admire a sunset; we admire a beautiful girl. Why shouldn't we admire the other, which is the law of Newton expressed in mathematical terms? And I believe this has to do essentially with the way in which our mind works, that essentially it is a psychological problem.

But on the other hand, we have had statements to the effect that something is beautiful as soon as it becomes useless, so whether you believe in what you just said or not depends essentially on your Gestalt psychology and on nothing else.

**Boas:**

Well, may I say that (since I've been introduced on the side) part of the Gestalt of course involved in admiring a scientific law in the form of a formula is precisely the removing of it from its application. Now looking at a pure parabola curve as drawn on a piece of paper is quite different from looking at it as incorporated in the silhouette of a female body, or on a bridge for that matter. These configurations are bound to influence your appreciation of the objects which you see and in fact psychologically are going to partly determine what you actually do see, because your attention is selective and is oriented by forces over which (as Mr. Nervi says) we often times are totally unconscious.

Now, I think the question of a pure form is a very

stiff psychological question because it isn't merely pure because it's in an airplane or if it is drawn on a piece of paper.

The only other way as far as I can see that you can get it pure would be to have it expressed in terms of mathematics.

**Salvadori:**

No. Mr. Nervi doesn't say that at all. On the contrary, he says that in his opinion a form is pure when it is the necessary consequence of a physical law.

Now, mathematics is not a physical law, mathematics is a fruit of the human mind and it is a description of things as we see them and Nervi talks about the actual physical reality as we have it in front of us.

**Boas:**

Well now suppose the Hermes of Praxiteles had a goiter. That would be due to natural law, physiological law, pathological law. And it could be explained and a physiologist or a pathologist might look at it in great admiration as a perfect example of an exophthalmic goiter.

**Salvadori:**

No, I'm sorry. Your statement is most humorous but it is wrong. Mr. Nervi is mentioning the purity of form of the unique form, which comes as an answer to physical law, and you have an answer with a goiter and an answer without a goiter so that is not unique and doesn't apply to what he says.

**Boas:**

Suppose a physiologist or a pathologist knows the law in terms of which goiters are produced. Then when a goiter is produced, he would see a perfect exemplification of that pathological law.

**Salvadori:**

If we all had goiters, yes, but if we do not all have goiters, no. That is not what he said.

**Boas:**

The law is established by consideration of all the people who have goiters and not of all the people.

Now, this is important, and it seems to me that one of the things we are constantly leaving out in discussions of esthetics is precisely the Gestalt in which the thing is observed. We fail to see the relevance of the form before us (whether it is literary, visual or any other kind of form) to certain general laws which we have accepted. Now I think that should never be overlooked.

Mr. Eckbo, you have the floor.

**Eckbo:**

It seems to me that it is kind of misleading to get involved in talking about pure beauty or pure ugliness. These are kind of abstract terms and it seems to me that beauty, for instance, is a relation between one or more observers and some form or situation which gives them a kind of reaction.

The kind of reaction we think of as recognizing beauty, and that something like a Beethoven symphony being established as beautiful as the result of an accumulation of thousands of these experiences. In practice, all we are concerned with is the area between extremes.

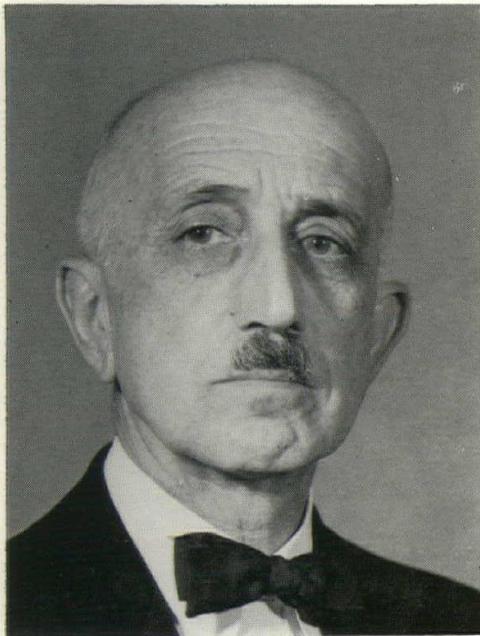
In other words, I think it is a misleading question to say—is there an ugly tree, because it is only a question of the situation that a specific tree is in.

**Boas:**

We have a fraction of a minute left. I wonder whether Mr. Nervi would be willing to say a concluding word.

**Salvadori:**

The conclusion of Mr. Nervi is simply to say that he wants to thank you, the audience, and the people at Raleigh, who have invited him to come here. He has had a wonderful time today. It has been a wonderful experience and he hopes these ideas will be discussed even more later on.



## TRADITION AND INNOVATION IN ART

By Dr. George Boas

Head of the Dept. of Philosophy at Johns Hopkins University, visiting lecturer at the School of Design.

I am very flattered to be invited to take part in this conference since in my profession you make up everything you have to say, and you have no facts to go on whatsoever. Usually such people are excluded from serious conversations and therefore, form things known as philosophical associations or aesthetic societies where they can talk to each other. Consequently, to talk to really serious people about things they really know about is indeed a very flattering experience for a Professor of Philosophy.

I think I should point out to begin with that I am making certain assumptions before I swing into the main body of my talk. These assumptions are very, very simple things, and I should think would be obviously acceptable, though usually they are not. The first one is that society is composed of individuals and, consequently, that the individuals are different from one another, and the second one is that human beings live in time, are historical animals, and whatever they do can only be explained if you consider the history of the activity in question, the original motivation which led to the various ways in which the motivation has been satisfied and the general pattern of human satisfaction.

Now I should like in what I have to say this morning to break up my talk into several parts which I hope are logical wholes. The first deals with tradition, and I am going to consider tradition as collective habits. We all are familiar with the habits of individuals which are one of the unique organic phenomena in the universe.

As Aristotle pointed out many generations ago, inorganic substances cannot form habits. They cannot learn, and if you throw a ball up in the air a hundred times, it keeps persistently and stubbornly and stupidly falling with exactly the same acceleration, and there is nothing you can do about it to slow it up or accelerate it further. Whereas any living organism while being put through its paces will soon learn to perform the act more quickly until he has reached a minimum of time. This, of course, as my students know, is one of my hobbies and I shall yield to the temptation of dwelling on a pure habit of mine.

There are two factors, two characteristics of habitual behavior, which I think are worth pointing out. In the first place, habitual behavior is always followed unconsciously. The person who is learning to play the piano has to look at the notes as they are written on the score, and he has to look on the keys and make an adjustment of the fingers to these visual sensations or perceptions which are on the score. This is a very painful process, not only to the people who are listening, which I think is obvious, but also to the person who is doing the performing. It is a process involving a great deal of conscious perception and conscious adjustment of a motor sort. However, after the process has become learned, as you know, you translate unconsciously, immediately, without any thought whatever, your visual perceptions into motive responses, and you put your music on the music racks and your hands do what your eyes see. There is nothing in the inorganic world to correspond to that.

In the second place, and I think this is equally important in considering tradition, habit becomes compulsive, which you all learned in Sunday School when it was a question of bad habits. A habit is bad, of course, when it is socially disapproved. We are conscious of our habits only when we start to correct them. Then we learn the difficulty of undoing this slow process of learning, bringing it all back to consciousness, untangling it all until we can actually correct it. This compulsive coefficient that all learned behavior has is one of the most impressive things about habit, and you cannot argue in the case of individuals from their possession of habits, that the habits in question are either good or bad. The psychiatric institutions are full of people who are ailing from a compulsive behavior pattern, and they find no way except through psychiatric treatment of liberating themselves from these compulsive behavior patterns.

If you will think of tradition as social habit, of collective habit, you can easily and also willingly admit the social disunity of individuals. You can then understand the conflicts of traditions within any society, and you can also understand why the individual when he is aware of the tradition becomes aware of it through reflection upon what he has already learned and absorbed almost unconsciously. The tradition becomes just as much part of the individual's makeup as his own habits become part of his makeup and, consequently—and this seems to me an extremely important point which my colleagues, the philosophers, often overlook—you actually can see value emerging out of the habitual performance through the feelings of guilt when you are performing an act which is socially disapproved—socially in the narrowest sense, as well as the broadest sense—and the feeling of self-satisfaction

when your behavior is socially approved.

You will notice here that this is an extremely simplified version of what a tradition is, and I am not in any sense attempting to either justify traditions as yet or to ridicule traditions. I am simply stating that a tradition is something which is of a social nature, and it is absorbed unconsciously by the individual, that obedience to it will, as in the case of one's obedience to personal habits, create a feeling of self-satisfaction or self-esteem, and a violation of it will create feelings of guilt and out of those feelings standards of goodness or badness.

Now, in every tribe or social group we find that obedience to tradition is enforced by the group somehow or other, and these sanctions may run anywhere from contempt, perfectly simple dislike of a person who is not in the tradition, to actual punishment. And when you think particularly of the influence of the common law in Anglo-Saxon countries which is, after all, by nature unwritten and is the tradition of the tribe which survived for at least a thousand years, when you think of the compulsions which are involved in obedience to the common law, you can see that you need to have a police force to insist upon obedience to these traditions. People absorb them, will be faithful to them, will carry them out and will feel guilty of not carrying them out. Yet the sanctions, if you do violate the tradition in question, as I say, may be simple sanctions like contempt, as in the University when a freshman walks on the wrong side of the street or sits on the wrong bench, which certainly doesn't seem to people outside the tribe to be particularly important. Here you get, as I say, a kind of sanction very simple to outsiders, but to insiders extremely important.

Now, there are plenty of examples of this sort of thing in such simple matters as speech. Speech, of course, talking and writing, but talking in particular, is an art which everybody performs. It is the one art I know of which everybody indulges in, if that is the proper verb. Speech is a very curious thing because nobody remembers how he learned to talk and no one of us knows how he actually produced the words. At least those of us who give public lectures find ourselves on the platform saying things, and the things just come out. You don't have to grope around for what you want to say. You don't stop to think of the laws of syntax and grammar. You just talk.

I remember a child of mine who spoke French and coming home from school one day said to me in French, "At school today the teacher said, 'Je dors, tu dors, il dort, nous dormons, vous dormez, ils dorment. Pour quoi?'" It was perfectly obvious that to this child—and I don't want to explain the obvious—it was perfectly obvious if you said something in French, it must mean something, and if this curious tribe of teachers, and, of course, to children, all of us teachers are a peculiar sub-species of **Homo sapiens**, stood up and said, "I am sleeping, you are sleeping, he is sleeping", there must be some meaning to the thing, and that there was any such thing as grammar, syntax, conjugations or anything of that sort must have seemed to her perfectly extraordinary as indeed it is, the grammar and syntax being not invented before speaking was but after the speaking.

Now in the case of speech you find a very curious thing which is a result of tradition, and that is that the symbols remain while the meanings change. There isn't a word in the English language, for instance, of any importance which hasn't become ambiguous.

If you look up in the New English Dictionary the word "art" you will see fifteen or sixteen different meanings which that term has taken on as history advanced. If you look up a word like "philosophy" you will find the same thing. The other day I found twenty-two different meanings for the word "idea". We retain the symbol while giving it brand new meaning, and thus we have the illusion of persistence, of endurance, almost of eternity.

In many of our symbols there develops a set of meanings which are as dynamic as the people who are using them. The meanings shift and change and become more complicated or fractured according to the needs of people who use them.

In the case of artistry you find precisely the same sort of thing going on. You find that there becomes a right way to speak and a wrong way to speak. Now, clearly objectively correct usage is simply what the statisticians would call modal usage, the way most people speak, and every attempt that has been made by academies or lexicographers to tell people how they should speak, such as the attempts made by the Academie Francaise, are obsolete the minute they are published. People do not look up the grammars, like Fowler's English Usage before they open their mouths to talk. The lexicographers, the grammarians, the scholars follow along afterwards, and it should be exactly the same way, I think, in the field of aesthetics. The inventive genius of an individual comes first, the aesthetician comes afterwards, just exactly as the planets didn't have to learn Kepler's Law before they started moving around the sun.

Now, the right way to paint is the way in which most people do paint. The right way to paint is the way that is sanctified by tradition, and since, after all, when you get to the point of discussing these matters, you are already an adult, you have completely forgotten how you ever learned to paint, how you ever learned to speak, how you ever learned to do many of the things you have learned to do, and you say that this is just the natural way to talk.

I have heard G. I.'s in England think that the English must be violating a natural law because they drink tea for breakfast instead of coffee. God meant men to drink coffee for breakfast, and I am sure that if there is an English equivalent to the American G. I., which I doubt, he would say the same thing about him.

It is also in this fashion, I think, that you can explain the formation of styles. The pervasiveness of a style—which Mr. Nervi spoke about beautifully yesterday—the pervasiveness of styles becomes compulsive after awhile, as the style gradually drifts down within the body of society or as an individual himself forms a style of his own.

You had here at State College in the painting classes a few years ago in Mr. Bromberg's

courses, a beautiful example of how the individual has developed within himself by the time he gets to college a way of expressing himself visually in line and mass and drawing as a whole. These things seem to be innate. The very doodles which are produced by a variety of people show individuality. A manner of drawing has become formalized; it has become crystallized; it has become habitual and compulsive, exactly as everybody's manner of speaking is a style of his own.

And, finally, I think tradition explains the persistence of forms in all of the arts, including your own, namely, architecture.

But now in the second place it must be admitted, I think, that all human acts which are not involuntary natural acts arise out of needs and out of the demand to satisfy those needs. The fundamental difference between the artificial or the artistic—if you want that word—and the natural lies in the rational satisfaction of our needs. Some of our needs are satisfied in the involuntary fashion that animals exhibit, and others are satisfied by the application of something which will likely be called reason to the natural act.

The Australian Bushman who wanders about the landscape picking up to eat whatever he can find is behaving in the same manner as the birds that go around scratching and picking everything and finding their food supply wherever it is. The child in school who gets into a scrap with one of his comrades, fights in a perfectly natural way, slugging and banging around, picking up stones and sticks; whereas, a boxer works out a technique for doing this, presumably in a more efficient way. Let me say in a footnote the technique in a case like that has to be considered in a much larger context, one of whose aspects is economic.

There are then fundamental differences between the way animals and human beings satisfy their needs, and I think this is shown in the differences between animal and human artifact. As far as we know the animal artifacts, the spider's web, the bird's nest, the beehive, wasp nest, and so on, are today just as they were thousands of years ago. If you read Virgil's *Georgics* you will find the description of bees to be living in exactly the same manner, according to exactly the same social constitution, as they do at the present time.

The distinctive thing about human arts is that they do have a history and that they change. It is true that if you take a work of art of any particular moment, you can probably classify it pretty well if you are in a society that is highly organized and traditionalistic; but in general I think it is only fair to say that you can write a history of architecture, a history of painting, a history of poetry, and so on, because actually poets, architects, painters, at different times, have actually changed the look of the thing which they are producing and are doing it for probably different reasons.

Now, to satisfy a need in its origin means to take thought and, clearly, at the beginning of the thing the person who is trying to satisfy that need has to sit down and think out

how he is going to do it, just exactly as your architect or engineer is likely to make drawings and models. I suppose he just doesn't move in and take over but does a good deal of preliminary work. Nobody can satisfy any need he might originally have unless he has something to go on without taking the thought and that taking of thought is one of the most characteristic things in the history of art. It is true, of course, that an artist after he has absorbed his technique is very likely to forget he ever took any lessons at all or did any preliminary work.

The most striking example of this, and one which I have cited frequently, for human imagination is after all limited, particularly when it belongs to a school teacher, is the case of Delacroix, who in his journal says in one place, "As for me, I can only paint when I am like a serpent shaken in the hands of a Pythoness." A few years ago the Louvre had a retrospective exhibition of Delacroix, and they showed several of his large paintings like the entry of the crusaders into Jerusalem. Unfortunately, they dug all the sketches for these things right straight down to the little pencil sketches or notations of costume, of jewelry, of the way hair was curled and all of that before he started to put his brush to the large canvas.

Here is a beautiful illustration of how it is possible for a man to have so completely absorbed his technique, his artistry, as to become totally unaware of them, having the illusion of inspiration of doing a thing in an unconscious way. Exactly the situation of anybody who is performing habitual or realistic behavior. But now, and here is where tradition gets in its influence, any way of satisfying human needs may become traditional and here, too, you have a striking parallel with the formation of habit.

We know, as I have said before, that the fact that an individual has formed a habit is no proof at all that the habit is of any use to him whatsoever and in fact we have plenty of cases, as I say, where the habits are pathological, and the individual possessed by them has to go through a course of re-education to get rid of them. Nevertheless, the compulsion to satisfy a need in a habitual way is just as strong in the case of an unwholesome and unhealthy habit as it is in the case of a useful and healthful one. And, consequently, you will find that there is always a resistance to invention, to innovation, to reform of any kind because of the compulsiveness of tradition and, furthermore, you will observe, I think, that in the history of human activities, in general, speech, the fine arts, the crafts building, or whatever, you will find that the originally satisfactory way of meeting needs will become traditional and will be retained as sacred after obsolescence set in.

Now, the sacredness of obsolete tradition is one of the things that I should think would be obvious to any student of the history of art, the way the form of behavior persists after its original purpose is no longer present.

Let's take a perfectly simple case which is trivial to be sure but its triviality I don't think is irrelevant to our present discussion. In the United States of America when a person is

married invitations are sent out. Those invitations are usually engraved invitations instead of printed invitations, and one of the things that is most interesting about them, up to at least a few years ago, was the engraving was made to imitate writing, handwriting. Nobody, to the best of my knowledge, ever thought of sitting down and writing out by hand a hundred and fifty or two hundred, or whatever it is, wedding invitations and putting them in envelopes and shipping them off, but he has to imitate handwriting, and the handwriting has to be engraved and not printed. Because of the element of conspicuous waste, to be sure, and the fact that it has got to look as if it were handwriting strikes me as fascinating since practically nobody writes anything by hand anymore. I suppose in the last fifteen years the only things I personally have written by hand are letters of condolence or something like that to old ladies who would not be able to read what I might have written, but it is much better to receive an illegible handwritten letter, presumably, than one which you can read. Why—well, clearly, there is no sense in this sort of thing. I mean this is just about as sensible as these vestigial organs that men carry on their coats. I mean these buttons which don't button anything. Our costume, that is, male costume is a longitudinal cross-section of the history of male costume in the Nineteenth Century. A buttonhole is over here with no button over here, but it remains very much as the vestigial organs on the human body, the vermiform appendix and the nipples on man's breast. Utterly unfunctional, but nevertheless, all of this is part of the tradition and must be preserved. The most striking case of the retention of obsolete instruments as something sacred and noble is the tradition of settling international disputes through warfare.

Up to very recent times, the heads of states were always for ceremonial purposes presented as Military Chiefs. George VI of England and Elizabeth II on ceremonial occasions are in military or naval uniform, as the case may be. I doubt very much if Queen Elizabeth has had any active service—although she was in whatever corresponds in England to the Wacs—nevertheless, she is a Colonel for ceremonial purposes, and the ceremonial business is the important thing.

When I got my Bachelor's Degree, the diploma was given to me in Latin or what went for Latin in those days. Few of us could translate it but, nevertheless, it had to be in Latin. It had taken on a kind of sacredness because of, not in spite, of the fact but because of the fact, that this was an unuseful—I shan't say useless because it does serve a certain function—but an unuseful tradition.

Now in the case of settling international disputes through warfare, very, very few people are going to say any longer, I suppose at least in civilized countries, that this is the most effective way of settling these disputes. We know other ways of doing it, but after all, we would much rather lose thousands of lives than lose face. This is a very curious situation indeed, ladies and gentlemen, and I simply throw it into your laps for what you want to do with it, but it seems to be a perfectly beautiful example of how an obsolescent

utility may take on a new kind of value because it is obsolescent. If it were useful, the profession would not be as noble a profession as it is supposed to be. If I am right in having emphasized tradition to this extent—how in the world do we ever get anything new? Innovation clearly does exist. Since 1900 or at least since the First World War we have been living in an age of great innovation in every field, in science and all the arts, in religion and religious organizations, in politics, and certainly in philosophy—one of the great revolutions which the human race ever has been through, comparable I should think with the Renaissance in Italy. All you have to do is imagine a person like Bouguereau having a conversation with Matisse, or Picasso, and see how close together they could get, or imagine an English scientist like Tyndale trying to discuss something with Dirac or Schroedinger. They would have no common ground whatsoever. The very bases of their science, and if the same thing is true of the arts, have been shifted.

We do have new problems which arise, and when our problems arise, there are always people of sufficient genius (a) to recognize these problems and (b) to attempt to solve them. This cannot be explained in any deterministic fashion whatsoever.

There are thousands of people who had been through relatively the same education as Sir Isaac Newton in the Seventeenth Century, but only Sir Isaac Newton was sufficiently distressed by the discrepancy between superlunary physics and sublunary physics to set to work to try to unite the two in a more general set of theorems. If you ask me why Sir Isaac Newton, what answer could I possibly give? The reason why one couldn't give an answer is that many of these deviations from the norm which we consider as problems had been observed for hundreds of years previous to the time of their solution, and people have waved them away as trivial, as monstrous occurrences, as accidents, or something of that sort. The books are full of this sort of attempted explanation. There isn't any explanation. I mean it is just saying, "Well, we are not going to be bothered with it", so that for a person to maintain that the discovery, let us say, of the law of gravitation was due to great social changes or economic circumstances, as I have seen done, overlooks a point. There is only one Sir Isaac Newton. Every period has dozens of people educated in about the same way in so far as human beings can be educated similarly, for they are all different. Clearly, you can't explain a Newton or Einstein or Aristotle or, if you please, Nervi or Salvadori simply on the bases of general social laws.

Consequently, precisely at this point the contribution of the individual makes itself felt. The individual, of course, feeds upon tradition. We are all born into tradition, all educated in a tradition; nevertheless, the perception of the problem which other people haven't seen and the consequent solution of that problem, these two things are always done by individuals.

If you raise the question when innovation is needed, you have to translate it into a further question of how much difficulty, that is, how much pain, how much suffering, how much

unhappiness will men accept, and there is no final answer to that question. People who have been through the war and have seen it at firsthand and not from three thousand miles away, know that there is almost an infinite amount of suffering that people will take and, nevertheless, survive somehow or other. People will crawl into the cellars of their houses and live there like beasts until the thing is over and when they emerge they will put up with almost anything. And, consequently, the discomfort of finding exceptions or deviations from the law is something that a lot of people can bear with stoic equanimity. Others, however, find that this is a little too much and will insist upon working out a solution.

This brings me to a very curious thing about human history, and that is that these two are diametrically opposed attitudes toward every innovation or any problem whatever, which I call meeting the problem by the technique of resignation or by the technique of rebellion.

One of the great things about military service is that you have to associate intimately with people who are not like yourself. You get out of your particular social group, and you wake up to the fact you are not the human race. This seems to be the greatest revelation that can happen to any individual whatsoever. For certainly in the field of aesthetics when you say one feels this or that when reading Hamlet, when looking at Notre Dame de Paris, nine times out of ten this means when I look at it I feel it, and, of course, as I feel it, everybody else must feel it, that is, you consider yourself to be not only a fair example of the human race but a perfect example of the human race which you believe to be homogeneous.

Now, in military service you realize the astonishing fact, that some people are really happiest when resigned, when submissive, when living in accordance with the rule that "the life of humility," to quote Saint Bernard, is the life which is a fulfillment for many members of the human race. Whereas, on the other hand, what we extol as freedom, leadership, and all that ad nauseam, really is a kind of life which many people find utterly intolerable. The acceptance of responsibility is a thing which many of us can't take.

Now I am not saying—and let me emphasize this at the outset—that a person who is resigned in one field is going to be resigned in another field, and a person who is rebellious in one field is going to be rebellious in another. Human beings don't react that way since the days of Marcel Proust. After all we have learned about the intermittances de coeur, and we know that human beings are extremely complex and that the man who will be humble and submissive, let us say, in his religious life, may be aggressive, domineering, and even tyrannical in his business, so that I am not dividing people into those who are resigned and those who are rebellious at all. I am merely saying that in the facing of problems and the solution of problems, the technique of rebellion has to be set against the technique of resignation. Consequently, what you are going to find is that innovation is going to be made by the rebellious, and it is going to be made against the opposition of those who are resigned. You see this in urban life in particular. Where you have an over-all pattern of living which is, of course, imposed upon the members of that city, to change anything which goes on in that city, to modify the tradition, becomes a major problem.

Now, all history of art—of the history of all arts I should say more correctly—shows this interplay between rebellion and resignation, between innovation and tradition. Clearly, new materials and so on present new problems, but the observation of the problem is not automatic. The situation reaches a point where some individual is not able to tolerate it any further and he proceeds to rebel and to start an innovation of some kind. In the case of our social life this, of course, is very clear, and we must realize that conflict in the state—or in society, if you prefer—as well as in the individual is a normal sort of thing. This is similar, it seems to me, to the example that Mr. Nervi was giving us yesterday morning of the curious interplay which eventuates in a work of art, and in this case, a work of architecture, between the laws of the science which are applying and the creative imagination of the artist. You are absolutely free to do anything you want to, and, nevertheless, you are not absolutely constrained to do one thing rather than another. The constraint, of course, exists, and your artist, however rebellious he may be, nevertheless, if he is painting a picture, has got to use paint on a flat surface or build up his surface in some other way. In other words, he is going to have material.

Sometimes, of course, you have an art like that of the baroque, which is an art of defying the limitations of your material. The best example I can think of in that case is Bernini's famous statue of St. Theresa, which in my youth was considered one of the worst examples of sculpture that the world had ever seen. In other words, my generation was taught to believe that the word baroque was a synonym for horror. Now the statue of St. Theresa, many of you have seen it or seen photographs of it, defies every law of sculpture. It is made in a heavy material, but it represents a saint lying on a sea of clouds. It is stone—doesn't float; nevertheless the saint is lying down there floating. There are rays of light coming down the dome, and you can't represent rays of light in sculpture. Furthermore, there was being represented St. Theresa in a moment of mystic vision, which is an entirely momentary thing which passes in a flash; nevertheless, it was represented in the most permanent of material. Consequently, it looked to the critic as if this was a case in which Bernini, instead of submitting to the limitations of his material was defying them, and, of course, if you believe that defiance of material limitations is in itself intensively evil, then you would have to say that this was the worst possible thing that any sculptor could do. But, on the other hand, when you stop to recognize what he was symbolizing or representing, if you perceive in this thing, a mystic experience, and when you stop to realize that a mystic experience is in itself a successful defiance of the limitations of the human body, then, of course, the congruence between what was being represented and the way it was represented becomes perfect, and Bernini suddenly turns into a very successful sculptor instead of into a sculptor who had never read John Ruskin, and, therefore, didn't know how to behave.

So before closing, I want to be sure that I am not leaving you with the feeling that I am on one side or the other. It is perfectly clear that just as habit is absolutely essential

to the successful and well organized life of an individual, so tradition is essential for the well organized and well adjusted society.

If we didn't have habits we would have to improvise every moment of our lives, which, I think, you realize perfectly well. If you have to get up in the morning and have to say, "What do I do first," clearly you wouldn't get very far. The puzzle of whether I shave or have breakfast first becomes one of the predominant problems of life which becomes almost insuperable because you have nothing to go on. You can't look it up. You can't telephone a Dorothy Dix or somebody and say, "I am in this awful situation; can you help me out?"

I remember a case of a soldier returning from the war who found, or read, or was otherwise aware of the fact when he got home that in front of his father's house there was a circular patch of flowers, I imagine cannas and dahlias—that's the tradition—and he had to go around the circle to get up to the front door, and he stood there puzzled, "Do I go this way or do I go that way?" Fortunately, he had enough sense to get in touch immediately with a psychiatrist.

Well, this is a perfectly simple and I think revealing example of what life would be if we didn't have habits, if we didn't have traditions to go on, and I am sure that in any social group the emergence of traditions and the compulsive force of traditions do give everybody, no matter how rebellious, a feeling of stability, a feeling of belonging to something. It is a liberation that is, exactly as your technique is, a liberation for your imagination, but on the other hand, when you have a society which is so completely dominated by tradition that people go into traumas when they see anything which is different from a tradition, then clearly the thing has gone a little bit too far.

If you go back, as I frequently have done, to the critic, for instance, of the Nineteenth Century, let's say, of the first impressionistic group in Paris, you find the most extraordinary statements being made by them. The first group, if you remember, was made up of such wild men as Manet, Monet, Mary Cassatt, and Degas, anyway, people who are hanging in every museum today and looked at in complete tranquillity by the observer. Their exhibition, as you may recall, held at Durrand-Ruel's was described by Lucien Wolff, in the **Figaro** as, this horrible thing which is driving people out of their minds. I was walking down the Rue de Royale when I saw a man dash out of it and bite the passers-by. Now, it seems to us utterly incredible that anyone looking at a painting by Monet or a painting by Degas would think that this was going to drive him crazy or that it was a piece of deliberate hypocrisy or this was an attempt, as Ruskin said about Whistler, "to throw a pot of paint in the public's face."

But oddly enough, the violation of a tradition is always—I think it is safe to say—is always in a statistical sense attributed to something immoral. Don't ask me why this is, but a social group always thinks obedience to a tradition is not simply a useful device for keep-

ing the group together, but is one of the basic tenets of a moral system not to reason why in such cases. This is the law. Father says so, and you have simply got to do it, and because of the compulsive force of tradition, you probably will do it.

Now, if you are living on a Pacific Island, you might say, where the population is fairly stable, where the food supply is sound and plenty of whatever you eat, fruit, or something, I think the books say, and enough trees and plenty of fish in the sea, and so on, and no earthquakes or tidal waves and floods of various kinds and no catastrophes of a natural sort, I suppose you can have a purely traditionalistic society in which everybody would be resigned and in which a certain way of living would be perpetual. However, if you happen to be living—just taking this into the simplest possible way—in a geographic situation in which this is not the case, then clearly following tradition is not going to satisfy yours needs whatsoever, and you are going to be forced to listen to the innovators whether you want to or not.

I don't want to take your time to list all the things that have happened since 1900 to make men change their mind about certain things. Running all the way from the economic structure of society right up, or you can say down if you want to, to the arts. It doesn't make any difference which direction you locate these things in. But even the most personal glance over the history of the last fifty years will show people that the actual problems, the actual deviations from the normal state of affairs, have been so great that it is impossible to answer the questions which they propound to us by simply saying "Let us do as our fathers did." Now we won't always be aware that we are innovating because as I said we will use the old symbols for new meanings.

The church in America, or the churches if you prefer, have become social organizations. They have taken the place of the old clubs, and you might say that we have developed here a religion of charity, meaning brotherly love, rather than a religion of faith. There is no question about that. Nevertheless, the churches look the same, they think the same, they use the same words to explain what their mission is and what they are doing; and they are talking in exactly the same way as they did a hundred years ago when religion was quite a different affair from what it is now, even in New England where religion in the Seventeenth Century was largely mystical and a religion of faith and insight on the part of the individual. The parish houses are getting bigger and there are few churches that don't have a social hall connected with them. This is a perfectly good example of the kind of thing I am talking about. You submit to the innovation if you are allowed to keep the old language. In my own field you find this over and over again. There is scarcely anything in the history of philosophy which is called by any new names, though the ideas have changed tremendously, and it has now become the great occupation of the historian of philosophy to write the history of ideas.

George Boas

QUESTIONS ADDRESSED TO DR. BOAS  
FOLLOWING THE PRECEDING ADDRESS

**Question** - Your discussion was extremely interesting, and I wonder whether you would advise those of us who are listening to you to read the book by Camus, "The Rebel", which has been recently translated into English and in which the position of the rebel is presented in a magnificent, thorough and very provocative way. I believe that you will find there a large correspondence of ideas between what you've said and what he is saying in such a poetic way.

**Boas** - I certainly should and I think that Sartre too would be a good person for undergraduates to read. I think that one of the terrible weaknesses of our liberal arts education in this country is that the students are spending time on the things which are no use to them and neglecting the things which are of use. I don't mean by things that are of use political economy and accounting. I mean two things particularly. One is psychology, good sound behavioral psychology, not muscles and glands, but the way people behave, and the second is cultural anthropology. You will never get this society to wake up to its problems until it knows those two things, I mean until it has a **mass** of people who really know these things. Now if they have time, they might study the history of ideas besides. Just take one idea and see its mutation, if there isn't time for more. In the case of the rebel, we do in this country a lot of lip-service to rebellion. In actual practice of course we are an extremely conformist country. We have completely forgotten the fact that George Washington and his friends not only advocated the overthrow of the government by force and violence, but did it. We also have a certain respect for success. If they hadn't succeeded, we might feel differently about it. But here you see beautiful illustrations of what I was talking about - the retention of a symbol when the meaning has completely changed. As far as the rebel in society is concerned I think he has to be put over against the man of resignation or the saint if you want to call him that (these are getting to be pretty picturesque terms), and I think a society emerges out of the conflict and tensions between these various groups. Nobody is rebellious about everything - nobody is resigned, I suppose, about everything. Furthermore, when we talk about society and its pressures, as we have, we ought always to remember, I think, that nobody lives in all of society. That is, we live in small social groups and it's the pressures of those groups upon us and upon each other which present to us most of our ethical problems.

**Question:** Someone said sometime in the early twenties, I believe, that every man before he is twenty-five who is not a revolutionary has no heart, but any man who

beyond his forties is a revolutionary has no brains. I have found, having been brought up in Europe and teaching in American Institutions, that there is very little of that rebellion in the normal American student. It is something which has amazed me somewhat and perplexed me. Can you elaborate on that?

**Boas** - I think I could a little, but not profoundly because I don't know enough about it. I think it should be remembered that we still haven't finished our adventure. We haven't settled down except possibly in the South, but in most parts of the country we're still on the go, and there is in the forming of any nation, of course, this period of adventure where your problems are not solved, where you haven't developed a completed pattern of culture, and where you haven't really a finished tradition. As I see it there is a tremendous contrast in this country between the kind of society in which I was brought up, which was the village culture of New England and the plantation culture of the South. If you say one of these is really America and the other isn't, of course it's nonsense. America is what comes out of the conflict between the two of them, the tensions between the two if you please. But if you go through the Middle West and California and so on, you begin to become aware of what I call the mobility of the culture, the fact that we haven't got to the end of the road as yet. But only in the New England culture-area, to talk like an anthropologist, or the way they used to talk, do you find the people settled down and it is true the North is where you find rebellion on the part of the students. The Harvard student, the Johns Hopkins student, maybe even the Yale student, for all I know, though it seems unlikely, are in a state constantly of effervescence. You find all kinds of clubs for this, that, and the other and they are always going lickety-split after something or other to overthrow something or other. The curious thing is that here in this sort of borderline state, you have one of the most progressive art schools probably in the country. How it is received, what need it satisfies, I just don't know, but certainly judging from comments which were made upon the exhibition the other day, I should say it was received with the greatest of enthusiasm and on the part of some of the younger students from other universities as a kind of revelation of what could be done. If I were to talk about the pressures of a plantation society I would be talking nonsense because I really know very little about it. But I can see that in that kind of society where you still have vestiges of feudalism, (though of course the South is also in a frightful state of conflict between the old society and new industrial society, in

places like Birmingham and Atlanta for instance) if you were to talk in those terms you could easily see that the need for innovation or for change probably wouldn't strike the Southern student as much as it would the Northern one. A person living in the South, (I may be entirely wrong about this), wouldn't be entirely sensitive to it.

The thing that interests me in the history of culture is that you can find a definite need occurring over and over again without people seeing it. The tolerance for exceptions, the tolerance for the accidental, is perfectly extraordinary. Aristotle could absorb no end of monsters, accidents, exceptions, privations as he called them, and get along perfectly comfortably with them. For dozens of years, scores of years, people must have known of the deviation in the secular perihelion of Mercury, but what difference did it make? It's a trivial thing and you will probably work with it all right. For a fellow like Einstein this becomes simply intolerable. It doesn't amount to much arithmetically speaking, but it is precisely that little thing there that causes the trouble. Someday, I should like to do a study of the way in which we crystalize our ideas, believing very strongly in a kind of existentialism, I suppose, which is what makes me so friendly to Camus, namely that the individual object, this stone, this tree, this man, are the only realities. Why do we classify as we do? For an Aristotle, it was perfectly satisfactory to classify all material objects as earth, water, air, and fire. It wouldn't do after Lavoisier's time. Now on what basis do we make these classifications? You'll find often-times that the artist (particularly in painting) becomes the victim of the classifier (philosopher if you want) and he sets up certain types of things that he's got to do, so that it becomes of the greatest importance to him to produce for instance, the perfect landscape. The 18th century is full of books on how to make a landscape, and these authors know what a landscape is. (I wish I'd known I was going to talk about this—I'd have my citation correct) There's one book in the Hopkins library which differentiates different kinds of landscapes. There is the pastoral landscape, the sublime landscape, the picturesque landscape, and it tells you how to make these things. For instance, I remember that if you want to make a sublime landscape you want to put in mountains, cascades, goats, and if possible banditti. Now these become petrified forms and they seem awfully funny to us when we don't accept them any longer, but note how they are used actually in criticism. When a person says, for instance, "Well this is all right but it isn't really architecture, it is engineering", as if that made a particle of difference. This is a building. This building, Joe building, and that's the important thing. Or they will say this is all

very well but it isn't a novel as if, you see, the fellow writing the thing was trying to exemplify certain class traits, and I don't believe that he is at all.

**Question:** We use expressions today like clean architecture, pure architecture, a building should be clean and critics of architecture tell the students to clean it up. In other words, they are putting a value on their cleanliness. I was wondering if that's something that will pass too, in other words, fifty or one hundred years from now we will look at these clean forms and looking back we can say that that is just another style of 1950. It seems to me we have finally reached the absolute in purity and cleanliness and if we pull back into history I think even the Parthenon, which certainly is considered today the acme of perfection, but at one time around the Gothic times it was considered by the French architects an ugly building, something that should be torn down - a horrible looking building.

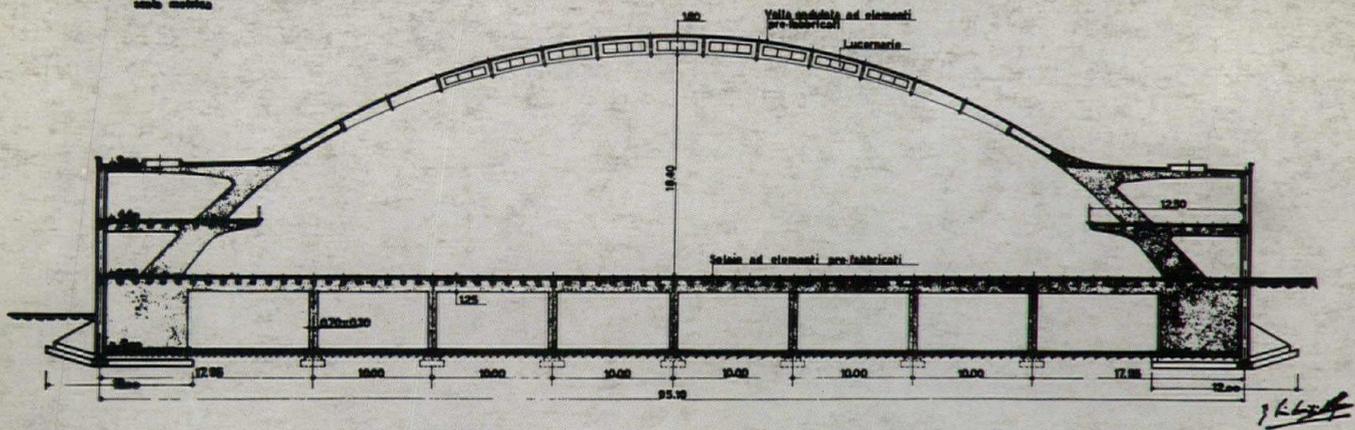
**Boas** - I wouldn't know. I mean I don't know how to prophesy about those things but I have a feeling that pretty nearly everything disappears when people become tired of it, very much like philosophical problems. As one of my colleagues said, philosophers don't solve problems, they get tired of them. That's probably true about styles. There is, however, a certain persistence of these things and the thing that I would fear would happen was that after you had reached this ultimate purity which Mr. Nervi was talking about yesterday, somebody will come along and say now we must dress it up. Because after all, take one of my favorite buildings, (malicious to have it as my favorite) namely Garnier's opera house in Paris. If you strip off all the applied ornament you have a classical building and a very simple and pure one. So that what you've got there is a building as simple, as classical, as clean as you want which has been all dressed up. This is very much like the ladies of the Second Empire. I don't know how clean they were. Anatomically, I'm assuming they were like everybody else, but when they got dressed, instead of putting on a costume such as they wore during the First Empire, they began sticking things on it, little garlands with rosettes etc. This pervaded the art of the time. As a matter of fact it's a beautiful illustration of what Mr. Nervi was talking about, how a style and a taste do become pervasive of a society. Well, you take Garnier's opera house. I'm sure that any of you architects could strip off all of the symbolical statues and medallions and you'd get back to something which is a very simple clean building, which in accordance with all the principles of Gaudet could be read from the outside. The whole anatomy of that building can be read from the facade. Gaudet is another person who should be re-examined, it seems to me.

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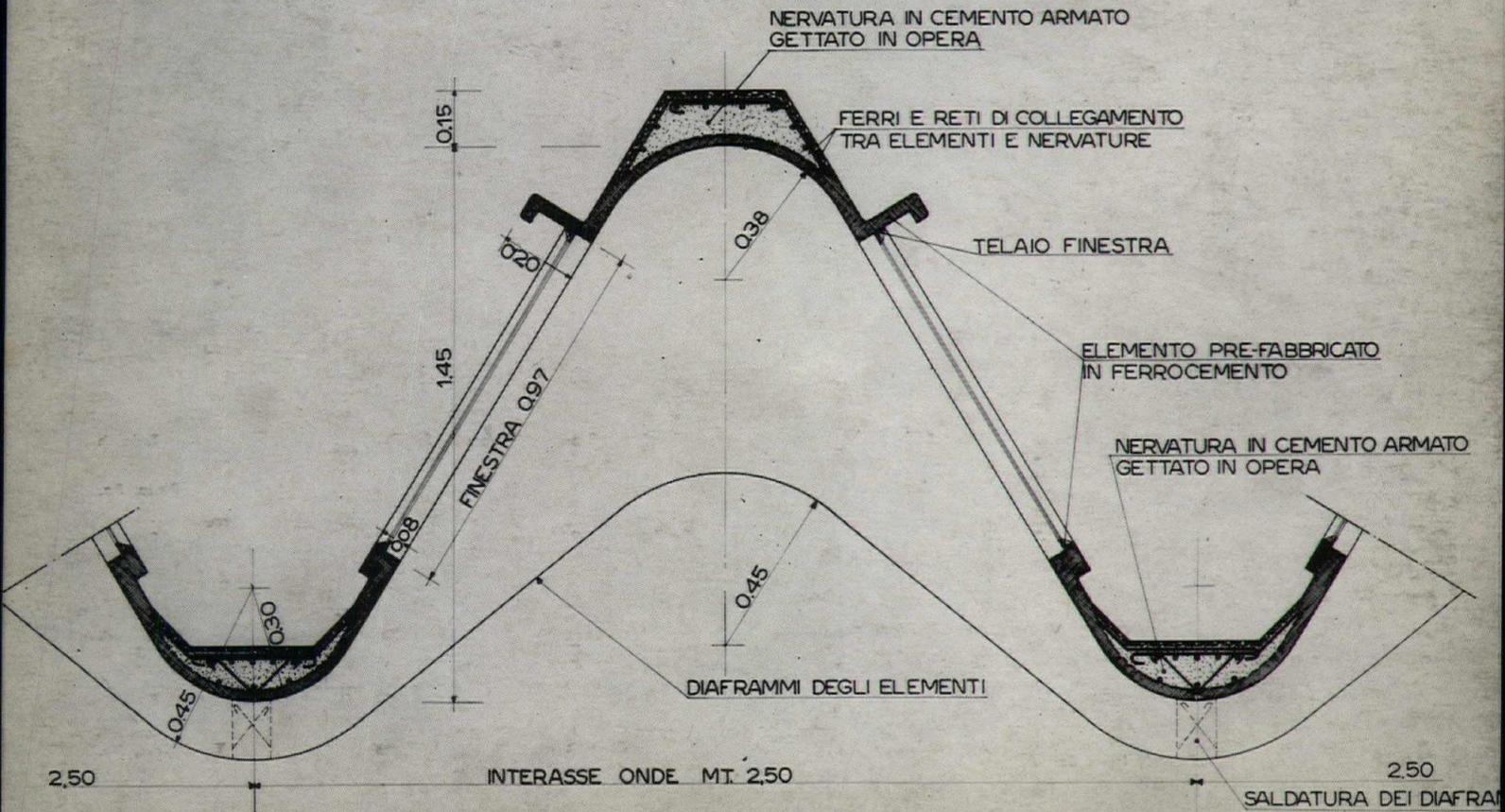
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