

Architecture? Mathematics!

Our building design needs a new axiomatic, to find to aesthetics, harmony and form. The key to this lies in the "ambiguous" seeing.

If we walk through the cities, it is noticeable that the "old" buildings are very different from the "modern" ones. What do we like to see on an Art Nouveau facade, on Gründerzeit buildings, on Roman, Greek, or Egyptian buildings? What aesthetics and beauty appeals to us sensually. Why?

The reason is obvious. The classical buildings consist of a functional part, the plastic, and an artistic part, the sculpture (ornaments, friezes and decorations). The artistic part portrays the philosophy or worldview of the style epoch.

By plastic (P) we mean something that arises from the accumulation (+) of material in space. Under accumulation we can imagine an additive process. A hut, a house or a building is a plastic.

Under a sculpture (S) we understand something that results from the removal (-) of material. Under the subduction we can imagine a subtractive process. A cave is a sculpture or the David by Michelangelo as well.

Plastic and sculpture are made of different, one can even say of opposing qualities, plus and minus. Most modern buildings consist of the same, serial elements. The aesthetic design principles, as they were expressed in classical sculpture and ornamentation, have disappeared. Functionality and seriality is the basis of our modern economic systems: it is depicted in this architecture. We have been following plastic and sculpture for 40,000 years, from the Paleolithic to modern times, in art and technological construction. Almost throughout the history of the Homo sapiens we see sculptures as habitable caves and artistic artefacts, plastics as huts, houses, roads, paths and bridges. Are the plastics and sculptures a universal basic pattern, especially when we take into account that the whole worldview or philosophy is encoded in its arrangements?

The criticism of the current architecture is becoming stronger and more sustainable.

Throughout the critique, it's always the same demand that gets loud: more aesthetics and beauty. But what is that?

The interrelations of plastic, sculpture, aesthetics, harmony and beauty can be seen on the ambiguous cube and derived from it. In this we use our human ability to see the same as ambivalent or bivalent. Therein lies the core of all artistic perceptions. To do that, we need to change our habitual view and get away from the classic idea of a cube, where the surrounding space does not matter. Because with the ambiguous cube, the surrounding space is decisive. To learn the new perspective, we have to learn to see the ambiguous cube three-dimensionally and two-dimensionally.

Normally we see the drawing of the ambiguous cube three-dimensionally as a cube in a corner of a room - a plastic or a cube cut out of a big one - a sculpture. The reason for this is that our perception system, as we live in a three-dimensional world, mostly interprets forms and colors in three dimensions.

To see the cube in two dimensions, it helps to think of two hexagons. If we are able to do so for a short moment, we can objectively see what is displayed on our retina.

The two-dimensional representation of the ambiguous cube triggers two three-dimensional perceptions, plastic and sculpture, at different times. At one point we only perceive 50% of the total information. So to get all the information, we need two time points.

The bottom line is that we are able to see the same thing alternative, or ambiguous, at different times. It has always been said that artists and architects are able to see the world differently. We can now clarify this and state that this ability is to see the "same" as ambivalent. By ambivalence we mean the bivalent, bipolar, complementary, that is, two opposites in the same.

Now it is necessary to take a closer look at the three-dimensional, subjective interpretations of the ambiguous cube. In ancient times aesthetics was a change of sensory perception. In terms of plastic and sculpture on a building, the aesthetic experience consists in changing the view between the two and thereby receiving a different perception at different times. This is a quantitative emotion-free change, plastic and sculpture do not change.

In the ambiguous cube, on the other hand, the subjective change in shape between plastic and sculpture is a qualitative one - a change that causes something: what an object is becomes space and vice versa. The whole shape changes. We perceive this change in a surprise, it takes time and changes our sensory perception one after the other, sequentially: we call this experience an aesthetic event.

If we observe the ambiguous cube on the drawing, the two perceptions begin to oscillate. We see P, S, P, S ... when we start with the plastic - or S, P, S, P ... - when we start with the sculpture.

This oscillation can be stopped by changing the dimension and go to the real world recreating plastic and sculpture.

So far, we have considered two-dimensional drawings and their two- and three-dimensional perceptions.

It is also possible to see three-dimensional objects two-dimensionally and to transfer this view to an image. As a helping tool, the painter may use grids and the constructive perspective, a method for the representation of three-dimensional objects on a two-dimensional surface.

In the real world, it becomes clear that plastic and sculpture are complementary to each other and that we can put them together into a single entity. Each of the plastic and the sculpture is assigned to a point in time where we can see both times and their opposites in one unit. We refer to this union of opposites in time as harmonious, in the style of Heraclitus, who *mutatis mutandis* stated that the union of opposites is harmony.

We recognize that the two opposites in the interior of the cube meet at a boundary and show this "inner form" as an "interface".

The three elements sculpture, boundary and plastic can be combined to form a whole again. The whole is the unity of opposites and the boundary. The whole is the form. The common thing that we can see in all the elements is the two-dimensional shape of the ambiguous cube which we can observe in the plastic, on the sculpture and on both sides of the

boundary. The boundary is a two-sided boundary, it contains on one side the shape of the opposing figure.

Looking at the process in terms of the temporal dimension, you see the plastic at first, and the sculpture at the second. The change between both requires a period of time. We perceive the change, the duration of time, as a sensually perceivable visual experience. It is the illustrated boundary, the interface and middle one between the plastic and the sculpture. It is the state of the present in which our attention changes: The last perception is already past and the future perception is not yet present. In short, when we survey the process, we see the past (sculpture), the present-boundary (our experience) and the future (plastic). We get a time logic. The forms of time: past, present, future get their expression in the wholeness, the beauty. This is the union of opposites or contradictions in time that enables us to grasp the past, present and future in one glance.

To visualize this wholeness: Imagine that you are a sculptor standing in front of a cubic marble block. To create a beautiful sculpture, you must „uncover“ the boundary from it. How difficult it is to „see“ the interior of this marble block or imagine this, you can certainly guess. In practice, the implementation is an iterative process - the sculptor is able to see the boundary in the whole. This corresponds to the oscillatory change of plastic and sculpture, the figurative sculptures are a testimony of it. In order to extract a sculpture from the block of stone, the negation of the sculpture, the plastic, has to be removed. Before the hammer blow the sculpture is seen, in the blow the plastic is removed. It is an oscillating activity between the theory of seeing and the practice, the blow to the chisel, which always demands the sculptor to be present and focused in order to see and do the "right thing" at the decisive moment.

Michelangelo is said to have said once, when he was asked about his method of working: he simply cut off the superfluous marble to free the figures from the marble! In order to give expression to these experiences of seeing, we need a new visual language of architecture and art. We need the language to communicate and to understand each other. In order to speak it is essential to know their axiom, their symbols and their rules.

Their axiom, the principle, and the first symbol we refer to, is the two-dimensional ambiguous cube. Their symbols are the ambiguous two-dimensional cube, the plastic and the sculpture.

The rules indicate how one symbol is converted into another. The four most important transformations we can perform with our visual system are first the transformation of a two-dimensional perception into a three-dimensional, either plastic or sculpture ; second the inversion, the transformation of a three-dimensional perception into a two-dimensional; third the transformation of a three-dimensional plastic perception into a sculptural one, fourth the inversion, the transformation of a three-dimensional sculptural perception into a plastic one.

We can use these perceptions in the architectural practice as a basis for the design and construction. The painting Interface 134 is our basis and an example of a buildable architecture of tomorrow



Interface 134

From the painting we design the basic architectural structures of plastic, boundary and sculpture. In contrast to conventional architecture, we do not show the cube, but its internal shape, which is represented by the boundary. We also call the boundary an interface or intermediate face, because it lies between the plastic and the sculpture. We build this interface, giving it a habitable wall thickness. On both sides the plastic and the sculpture are visible. The boundary also allows the view of both from each side

The ambiguous cube also plays a special role from a logical perspective. We can see him primarily as plastic or sculpture. Through this ambivalence we can not say exactly what he actually represents. He is thus, so to speak, the visual form of the paradox of Epimenides the Cretan, who said: "All Cretans are liars" and thus presents us with the difficulty of not knowing whether he is lying or telling the truth. The problem is undecidable or ambiguous, as is the ambiguous cube, whether it is a plastic or a sculpture.

The undecidability or ambiguity is the basis of our new formal visual language of architecture and art. It begins where the classical formal languages of the word and number have found their limit. Their axioms are the logical laws that have been valid since Plato and Aristotle. They are based on the concurrence of statements . We overcome this by observing the ambiguous cube, the axiom of our new language, on the basis of a temporal logic, in which, as already mentioned, we designate the change from one perception to the other as the aesthetic event. This ambiguous logic follows the clear formal logic of word and number.

We see a universal form in the ambiguous cube. Translated into architecture, it represents a form in which an observer can decide for himself how, what and how long he wants to see something. With our new language, we now have an instrument that respects this freedom of the other. The architecture for tomorrow is free of worldviews and trends; but it becomes a figure of thought, a sensual event and therefore human. It changes your view from space to time

The author is Artist and expert for complex structures based on the ambiguous cube. He lives in Karlsruhe.

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