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Research in architecture : reflection on three approaches linking research and design

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Research in Architecture: Reflection on Three Approaches Linking Research and Design

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Abstract

Research in Architecture is not new, it is usually known as analysis or pre-design stage. Architects get acquainted with program requirements, project context and/or other inspiring works, including concepts on theory, philosophy or history. Seldom are the architects who design without any conceptual constraints. Ranging from a pure mental exercise to a fully noted process, each architect processes the available knowledge and converts it into a project proposal. As such, architecture is always somehow a product of a research into a solution for a problem.

In this paper we analyze and discuss the pros and cons of three approaches linking research and design: evidence-based design, design in analogy and free design. Besides the state-of-the-art, this paper illustrates the approaches with final design projects by graduates (2009-2012) from the department of the Built Environment, Eindhoven University of Technology, the Netherlands, to exchange the experience gained over the past years while applying the different approaches in MSc graduate studios in Architecture.

The paper discusses the role of Research in Architecture, elaborating on the argument that research and design have seen different forms of integration related to paradigmatic shifts in history. A school of Architecture should not be alienated to those; it should explore and reflect upon their impact. As such, the

proposed reflections shall also include a discussion on the inherent raise of transparency and educational quality, as well as, on the added value of teaching multiple approaches within the context of one single School.

Keywords: Architecture education; Research; Design; Evidence-based Design; Design in Analogy, Free Design

Introduction

Design is part of the academic practice and it is there in various functionalities. For example, for architectural historians the products of design - shaped as built artifacts, architectural and urban plans or landscape visions - are the main subject of their research. For them these products are the stepping stones in the evolutionary patterns that can be traced in the history of facts and incidents. Such, as a *subject*, is the role that design plays for historians. Design as a subject of research however, is not what is aimed at in this paper. What interests us is something else: it is how design techniques may function in academic practice as a *method* to acquire knowledge and as a crucial extension of research, meant to *test* a certain hypothesis. This is an intriguing topic for reflection.

Research and Design

Many of the possibilities (and also many of the complications) of design in this definition are yet to be discovered. But during the last decade it has become urgent, at least for architectural faculties, to develop strategies to improve understanding of how design may be used successfully in academic terms. What is the background for this urgency? In many cases architectural faculties have their domicile in a scientific environment where the quality assessment of research output has become far more strict and bureaucratic during the last ten or twenty years than it used to be. In the competition between sciences architecture has proven to be a lame duck so far, because the academic importance of design, as the core of the discipline, could not be substantiated in solid proof.

Perhaps the reason for this is that design is not in the first place a tool for a better understanding of reality, but rather, a mental instrument for creating something new. This ‘something new’ is not per se meant to grow out of the blue, but implies that design aims at something that did not exist before. Design is a generic activity, part of many domains in society, leading to the creation of new artifacts in physical reality, although also services and human experiences may be the subject for design. In architecture we tend to concentrate on the artifact in physical reality; design, in that case, is a mental projection in the shape of a prototype, model or drawing, of which the attributes, specifications, characteristics and qualities can be observed and tested. It is not too daring to compare an architectural design with an experiment in the natural sciences, that indeed is also suitable for a check on the hypothesis that was taken as a starting point.

So, when the design practice in architecture is comparable with the experiment in the natural sciences, why does architecture fail in academic competition? It is not because the relevance of architecture for science or society is a problem in principle. It is also not because of the impossibility to publish the results of a design in a journal, or even a peer-reviewed journal. Everybody can see that designs are the subject of a great variety of publications on architecture, at least since Vitruvius. The problem may be however that the *quality* of a design may be very difficult to assess in scientifically maintainable terms, because a fundamental feature of an architectural design escapes the routine of scientific evaluation. In architecture

aspects of *aesthetics* will equal the technological or practical characteristics. Architecture, in other words, is also - and even inevitably - about *beauty* and *taste* – and taste is not scientific verifiable, at least not as easy as the verification of technique or practicality of a certain solution is. This appears to be a severe problem, but it is not the end of everything.

Design and Research

A solution seems to wait just around the corner, because the different character that architecture claims to have, being also an art, is not necessarily a stumbling block. A recent official investigation into the apparent problems of integrating architecture in the academic format of science came to the clear conclusion that quality may be measured adequately, as long as the comparisons are made *within disciplines* (KNAW, 2010). In other words: it depends on the clarity of standards that are accustomed within architecture, exercised academically, if the discipline may be considered a science or not. In even more other words: if architecture needs to become a scientific occupation, standards need to be defined. A standard for measuring the quality of architecture can impossibly be as sharp edged as is common in the natural sciences. We will have to work with more subjective, but still quite effective (if used with care and serious knowledge) categories. From different bureaucratic origins, also from what is accepted as a standard in the academic practice of industrial design, this paper proposes the following selection of parameters for judging the quality of a design:

- technical originality;
- cultural relevance;
- methodological coherence;
- level of craftsmanship;
- functionality on different scale levels;
- integration of whole and parts.

There is no reason why a round table of peer experts would not be able to judge a design in reasonable terms, using these parameters. Precisely because, standards for a scientific based architecture need to be defined, it is important that architecture schools invest their time in defining the position of design in their academic ambitions, and more in particular, dare to experiment with combinations of research and design. The addition of a research component will certainly help to enforce the rationality of what the design proposes. Research by design, as it is commonly indicated, is not a *dead horse*, as few like to call it, but a topic with urgency.

The department of the Built Environment, in Eindhoven University of Technology (TU/e), the Netherlands, may seem at first sight a curious place to concentrate on this topic, because the absence of sensitivity for aspects of artistic-ness in the very genes of the department. The department of the Built Environment was founded (in 1967) with the pretension of concentrating on the technical features of building as a clear cut physical science, rather than taking architectural design seriously as an art, with all its subjectivity. But perhaps it has exactly been this concentration on science that has seduced members of this team in TU/e during the last decade to join this interest for the measurability of architecture quality as an exact science, by investigating possible roles of design in research and vice versa. The platform for this experience were until now mainly the graduation studios, demanding the complete final year in the curriculum. These studios tend to function as collective platforms for research and design.
To prepare architecture students for a project with a certain research ambition, a methodological base is offered to the students in the curriculum of the preceding years. In projects and courses of the bachelor and early master phase emphasis is laid on a basic command of typo-

morphological research traditions, for example of Italian (Muratori, 1959 and Caniggia, 1979) or British origins (Conzen, 1960 and Whitehand, 1979). Also, aiming at the more specific levels of the grammar of building design, the theory of Monestiroli (2002) is offered during courses, so that students may be expected to understand the basic approaches to contextualized design. They must be able to distinguish between contrast, mimesis and analogy as starting points for producing architecture. We want them to have sophisticated knowledge, based on solid theory, on how to fit a building into a context. This does not imply an orthodox view on the issue of contextual architecture from the side of the tutors. Tutors are not supposed to force their architectural signature on the students. The ideal is an approach to architecture and its context with a certain flexibility, leading to a variety of solutions. What these solutions should have in common however, is that they all must answer the obligations of designing with scientific standards, whereby taken positions must be justified as precise as possible.

THREE APPROACHES LINKING RESEARCH AND DESIGN

Follow the reflection on three different approaches to design in a certain context, each mirroring a different attitude towards the interaction between research and design.

Evidence-based Design

The first example is a result of one of our studios that concentrate on locations that are designated by Unesco as World Heritage. These locations are maintained following the indications of the so called Outstanding Universal Value (OUV). The Amsterdam canal district is a good example of this and the executed research aims at identifying and analyzing the architectural features that convey the OUV and to uncover potential threats. In this particular case, the full *Herengracht* has been chosen as study area and what has been done is to register and map what has happened to what is now considered OUV within the more than 500 buildings in this area in six historical steps, starting in 1770. The research concentrated on attributes that convey the OUV according to the official documents, such as facade, streetscape, typology, style and silhouette. Discoveries were, for example, that, when distinguishing between base, middle and top of the facades, the top was adapted more often than the middle part and the bottom. Another discovery was that by far most of the changes took place before the middle of the 20th century: apparently the city image got frozen afterwards. More dangerous and even threatening for the OUV was what was noted considering the developments at the inside of the buildings under research: building consolidation, combining individual parcels into larger units, was identified as an influential process affecting the building typology. In connection with this phenomenon it was also noted that the silhouette of the Herengracht became increasingly flatter during the centuries, while the building height grew gradually, as did the building volume. As could be expected, another slow trend that was registered was the decrease of mixed functionality within the buildings: approaching current reality, residential and commercial functions seem to exclude one another (Swart and Claus, 2012; Swart et al, 2012).

This was what was mapped during the research phase of the studio. Decided was to position the design straightforward as a possible solution for the noted threats, especially targeting the aspect of consolidation as a result of the request for larger building volumes per function. This increase as such is not something that could be denied or reversed. Also opposed to advocating the reconstruction of original buildings (this appears to be fashionable in nowadays Amsterdam) this project offers a solution for a ‘large scale‘ program, adapting at the same time to the intrinsic qualities and historic value of existing buildings. It tries to do both: accept the functional needs, but also the constraints of the context. For Claus (2012), choosing the former headquarters of

the municipal telephone service as object for redesign, the solution was not to be found in redesigning the facades, but in turning to the inside of the block. By rearranging the inner court between two monumental canal facades, space is created for the Amsterdam fashion Hotel, a function that suits very well to the present demands on the canal zone. The facades remain nearly intact, while a voluminous program is given elbowroom, without denying the inner fabric of the building or its connection to the facades. As such this design is answering present functional needs, and fitting in a sustainable historic fabric. Very far away from the wish to create something spectacular, the design task in this case is interpreted as a response to a real problem, diagnosed during thorough research. Doing just that, without any virtuosity, this project probably comes closest to evidence-based design.

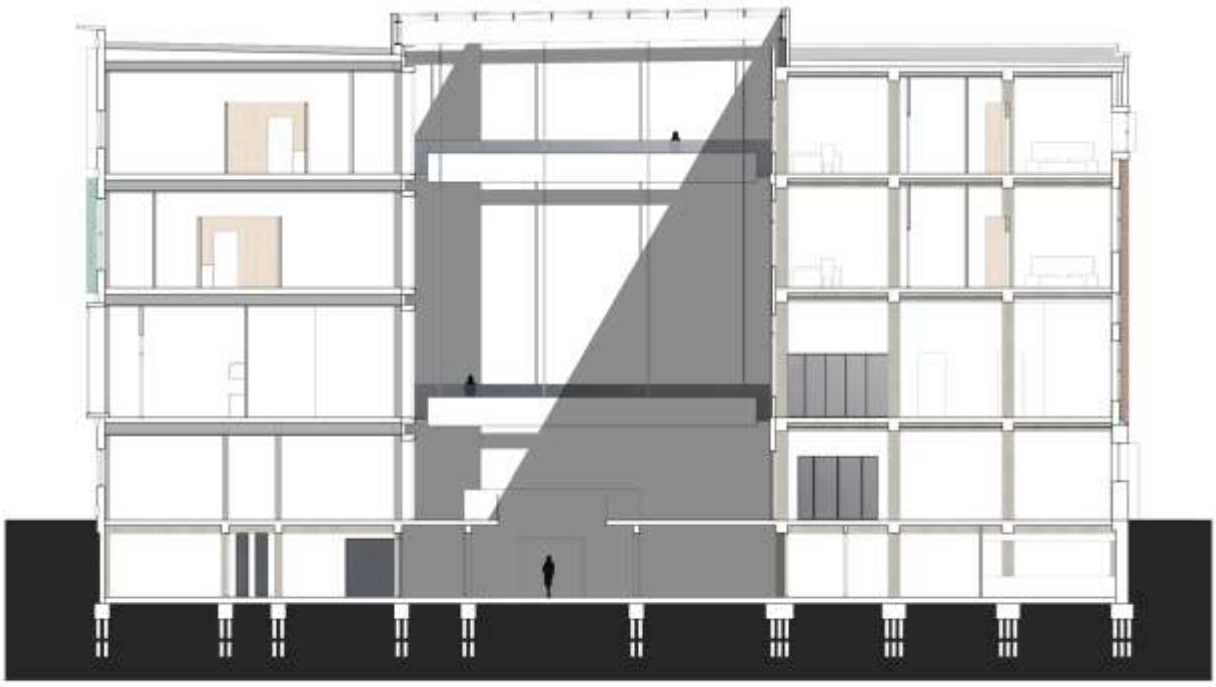

Figure 1: Section of the Herengracht 295 - Singel 340, Amsterdam (Claus, 2012)

Design in Analogy

The second example of a graduation project is coming from another studio, but again situated in the Amsterdam canal zone. It shows greater freedom concerning how the research is further developed into a design. This project is based on a time consuming investigation of the logic of parceling the plots of the various extensions plans of Amsterdam during the 16th en 17th centuries. Schlatmann (2010) leaned on the outcome of the work of architectural historians, for example of Jaap Evert Abrahamse (2010), who has accentuated in his recent dissertation the pragmatic intentions with which the plots in the canal zone were shaped and divided. In the three dimensions of realized canal houses the result must be considered the sum of individual interpretations of how a house should look like, determined by individual needs and tastes. At the same time technological, typological and stylistic conventions have clearly attributed to a archetypical standard of the Amsterdam canal house. This interpretation of the Amsterdam canal zone reflects the contemporary state of the art in architectural history, that was gratefully accepted by our student. Therefore, as a research project, this study into the housing of the canal zone followed a not unusual, not very adventurous pattern. But complexity enters the scene when one tries, as our student has done, to use the research for something else than

only registration, namely as a starting point for a design. What could be a relevant *new interpretation* of the deeply founded type of the canal zone house? The conclusion drawn started with the taken position that the pragmatic base of the plotting of the canal zone had led to an exuberant collection of architectural solutions, also culminating in the superb architecture of Hendrick de Keyser, Adriaen Dortsman and Philps Vingboons.
Thinking about a relevant new chapter in the story of this heroic architecture, the next step was that in programmatic terms the house as such does not deliver a very valuable source of inspiration anymore. Issues of program have become more or less architecturally indifferent. But perhaps the solution could be found in architecture in itself: in themes that only address specific building characteristics. Exactly this is what our student did, concentrating on designs for three plots, each with an own dominant architectural theme: respectively the entrance of light, the distribution of rooms and the circulation patterns.

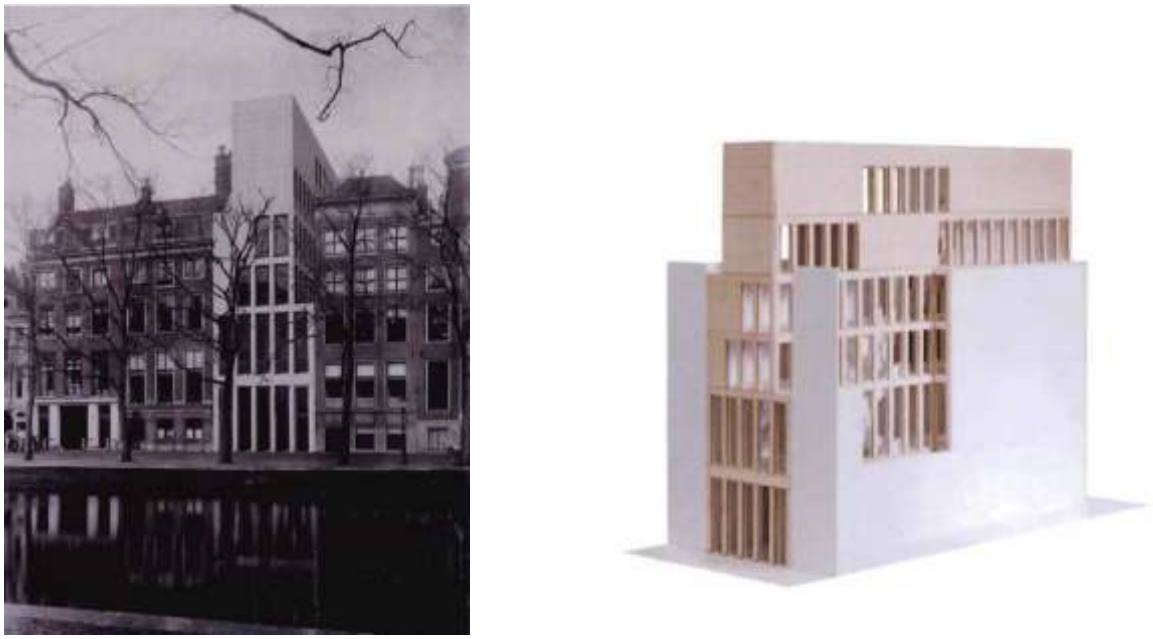

Figure 2: The house of light (Schlatmann, 2010)

In the second example a solid, coherent research phase is extended quite easily into a design phase, by enlarging a few selected architectural features - and leave out all the rest. In the next example to be presented here, a new methodological element enters, namely a preference for mental association as booster of both research and design. But also in the case of this third example the student was supposed to start his studies by accepting the map of the city (again Amsterdam) as a neutral ground for investigation and design. Soon, Linders (2010) concentrated on a specific zone of the map: not the canal zone this time, but the long girdle circumscribing it, along the so-called Singelgracht. What can be found in that zone is an uneven collection of rather large buildings that do not fit within the historical city and that were pushed out: big hotels, banks and so on. Continuing the research, the map of this zone of the city was not so much accepted for the richness of everything that might be discovered there, but mainly investigated for possible building sites. The search for the empty plot, that could be filled with something new, became target number one for this student. He found one next to the popular concert hall Paradiso. Then followed a series of short time, improvised investigations into aspects of his interest, considering the wish to design a building there. The first subject was the villa: in its architectural appearance, but also in its sophisticated upper class functionality. Another subject was the characteristics of stubborn buildings, like the infamous ‘Pepper & Salt’-

duo across the Rijksmuseum: buildings that are not meant to communicate in all directions but stand very much on their own. A few other, tiny subjects for study were added to all this, for example a drawing research into the variation of window frames used in the historic city. As an outcome, the design follows. The design that was produced in the end has become a kind of assemblage, in which the miscellaneous adding up of interests is brought together. The project demonstrates how loose research may lead to a kind of design in which the inspirational sources are digested and brought to a more or less coherent complex.

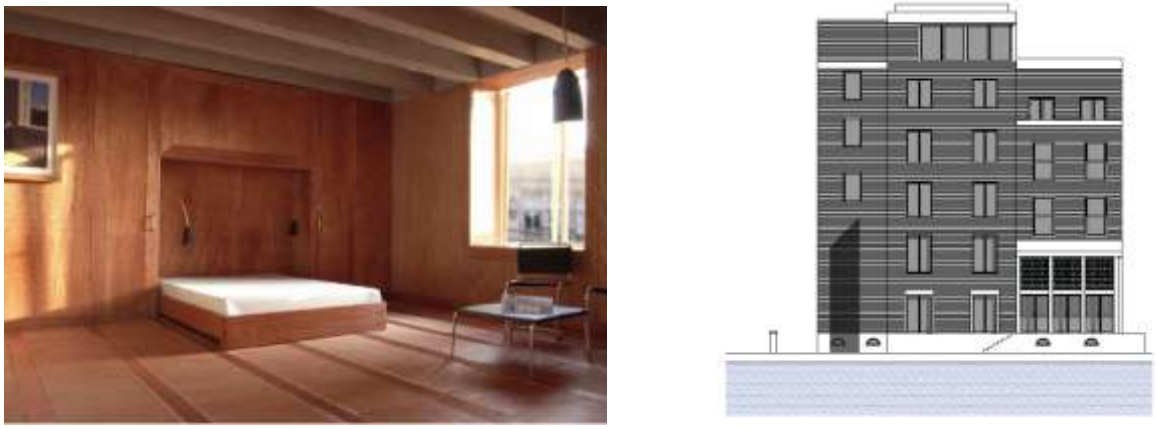

Figure 3: Hotel room and Building south facade (Linders, 2010)

Free Design

Complexity, but then in an exceeded version, is also the main feature of the last project that is presented here. It is one of the outcomes of a studio that took Robert Venturi's *Complexity and Contradiction* as a starting point. Question raised was if we would be able to discover explicit system in the richness of associations and cases in this small book, which is a very charming book, but also a book that leaves many aspects implicit. We succeeded in evoking them: it proved possible to elaborate the contents of a book into a scheme that distinguished a complete 'tree' of grammatical features, available for design.

We also applied the tricks that were derived from the Venturi book to specific buildings, often originating in the Baroque era, because that period excelled in architectural virtuosity. After producing the Venturi scheme as a collective performance of the studio, one of the students decided to continue working on only one feature of the scheme: the so-called 'vestigial element'. The vestigial element is a specific component of a building intentionally meant to refer to another reality or historical period: it is an element that is chosen by the designer to be integrated in a building in order to heighten the richness of meaning. Examples are the 'spolia' that were part of the extended building history (taking 170 years) of St. Peter's Church in Rome. Janssen (2013) discovered the wide spread use of the vestigial element in historical architecture, but also its perverted versions in postmodern architecture: for example in James Stirling's fake references to historical buildings in his National Galerie in Stuttgart. A vestigial element could also have a life size version, with the same function of reference: it could be a 'sign', like Adolf Loos's famous contribution to the Chicago Tribune Tower-competition. When the vestigial element could be life size, it might also lend itself for an adaptation: perhaps the vestigial element could transform into the abstraction of an archetype.

Where would it all lead to, this piling up of research tracks, originating in the idea of the true nature of the vestigial element? The student decided to combine the layered aspects in a

suitable building assignment, that would be able to bear this richness of meaning. She chose to design a Dutch library and study centre in Rome and make it into an all-embracing reference to the Baroque of its urban context. A claim that this design answers in all of its details the premises of the research would not be maintainable. But that doesn't undermine the relevance of the intense interaction between what is investigated and what is drawn. The research is functional here as a kind of a melting pot, out if which the design - admitted: after some trial and error - starts to produce itself almost automatically.

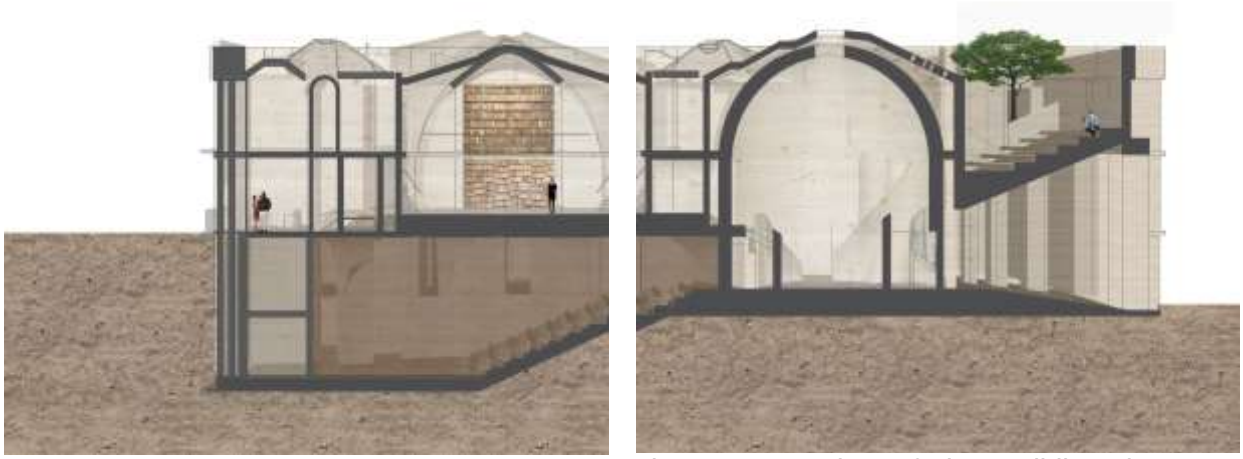

Figure 4: Section of the Building (Janssen, 2013)

REFLECTION

Presented in the preceding pages were four examples, following basically three approaches towards academic design. How different they may be, they all show design firmly rooted in research, with the context (and history in general) as a huge source for inspiration. Context is not always easy to handle: if it is cultivated as something immovable, context may degenerate into a dictate from which no escape is possible. Design, in that case, is a victim of cultural inertia. A design cannot start without free association; it needs a certain courage to cross limits, even if these limits are rooted in respectable scientific logic.
This is why evidence-based design needs a certain tolerance for deviations from the predictable. The education of an architect, the refore, is a sensitive process, in which both the objective and the subjective standards for designing must be brought into balance. The judging of what makes a design 'good' or 'bad' is the proof of the pudding. Counting and measuring alone is not enough: solid reasoning is obligatory, following the given parameters of quality. Aesthetics are not excluded from this process, but as the given examples show, aesthetics is plural – which makes the judgment of the quality of a design an act of truth finding, each time again

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