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On the Poetology of Design

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In this talk, I will attempt to give a few rather broad and general characterizations of what constitutes designing as a basic cultural technique. By »broad and general«, I mean that the following remarks and propositions are not intended to exclusively pertain to a certain subset of designerly techniques or practices (like designing by drawing or design in architecture), nor are they limited to a specific period in the history of designing. Rather, I want to start out from the conviction that, as numerous, diverse and complex as design activities may be and as much as their particular procedures have changed over time, subject to changing techno-economies and forms of knowledge, these activities all share a certain structure (or operative »logic«, if you will) that distinguishes them from other types of form-giving processes and that can be analyzed and described in general terms.

Understanding the genitive in both its objective and subjective sense, I have chosen to call this particular operative logic of design processes as well as the study of same logic the »poetology« of designing. This expression refers back to the ancient Greek word »poiesis« which Aristotle famously defined as a type of action that has its purpose or goal outside of itself, as opposed to »praxis« which encompasses actions that can be considered ends in themselves and which ultimately amount to the overarching goal of a good life. More narrowly, however, »poiesis« stands for »making«, especially the making or creation of artifacts, and is directly dependent on »techné«, the ability and the know-how of bringing these artifacts about.[1] Understanding designing as a mode of poiesis thus means looking into the implicit technical script that governs a designerly process of artifact generation and the faculties and preconditions that enable and determine its execution.

To do this, however, it is first neccessary to clarify the intended meaning of the second main term in the title of this talk. Even in its active usage to signify a type of process or action, the word »design« encompasses a range of different and at times mutually exclusive denotations. In a narrow sense, for example, it is often used to designate the central activities of the modern design profession that emerged during the Industrial Revolution.[2] In its widest sense, on the other hand, »design« is sometimes equated with the basic human activity of conceiving and creating the artificial.[3]

There is a third option, however, that avoids both the contingent restriction of the term to a historic profession and its essentialization as a natural and thus ahistorical capacity of all humans and instead allows to consider design, paraphrasing the historian of technology David McGee, as a distinct kind of *process by which artifacts get the properties*

they actually have[4] – that is, a particular kind of poietic procedure. The meaning in question underlies the nowadays common use of the word »design« to specify those activities within the context of wider productive processes and networks that deal with the development and evaluation, the definition and subsequent communication of artificial forms *prior* to their possible material realization and as a means of coordinating and controlling such material realizations. This becomes possible through the creation of external, medial *representations*[5] (or, more generally speaking, »models«) of the intended and not-yet-existing artifact which via a presupposed representational scheme specify certain attributes of same artifact. A designer, in this sense, would be anybody who produces descriptions, drawings, diagrams, analogue or digital models or other kinds of material representations of possible future artifacts or situations with the intent of concretizing what properties these artifacts or situations might have, assessing the desirability of their suchness and ultimately, in the positive case, effecting their realization.

More specifically, then, to avoid linguistic ambiguity, we could call this activity »design-by-representation« – a description that arguably most closely matches the core meaning of the German verb »entwerfen« which has no direct English translation other than the word »design« itself (and, in special cases, the verb »to draft«). »Design-by-representation« also is a generalization of design theorist John Christopher Jones' notion of *design-by-drawing* who coined this term to distinguish representational design practices from *craft design*, the method by which most artifacts in human history have been created and have received their final properties.[6] Jones' concept of craft, albeit being a bit of an idealization, can be helpful in grasping the defining traits of representational design procedures, since it specifies what, by contrast, can be conceived of as the standard mode of poiesis. Craft procedures, according to Jones, are first and foremost characterized by the fact that the final dimensions and properties of the resulting artifact are only manifested and determined in the process of realizing the artifact itself – there is no temporal and spatial gap between forming and making.

Expanding on Jones' description, McGee notes that a craft process thus constitues a feedback loop in which the artifact in the making functions as the main instrument of evaluating the validity of its own form. Any correction and variation of that form is brought about in a trial-and-error process of »cutting and fitting« that is inherently time-consuming, often wasteful of resources and, since it directly affects the outcome, limited by the makers' ability to, based on their empirical knowledge, forsee the possible consequences of that variation (or otherwise running the risk of wasting their precious time and materials).[7] All this leads to an often unaffordably high price tag for radical innovation or invention in most areas of craft production which is why Jones understood the craft-based development of artificial forms as an evolutionary process: He observed that the forms of craft products tend to change slowly, noticeably, at times, only over the course of centuries, through series of small, sometimes failing, sometimes successful

variations and that this process would often yield »an astonishingly well-balanced result and a close fit to the needs of the user«[8]. Jones also noted that »the craftsman who reproduces and modifies the form does not know all the reasons for what is done, he knows only the way to do it«[9].

Following Jones, hence, the acquired forms of craft artifacts are to a large degree not a result of single concious acts of imagination and deliberation, but of an anonymous, collective and largely self-governed, systemic dynamic of variation and selection. The place where these forms, in the absence of an independent medium, reside and propagate is in the realized instances of the artifacts themselves and, above all, in the know-how, the procedures of their production that are passed on between successive generations of craftsmen. Each craft artifact, in other words, tends to come with its own distinct »techné«, the operative script of its material realization, and changes in the artifact's form over time can be understood as the result of a recursive chain of small variations in the execution of that script and subsequent evaluations of the resulting forms that might lead to the propagation of a slightly modified, new script.

This brings us back to the inherently different dynamics of design-by-representation. By (at least partly) separating the process of form variation and definition from the process of production, the former is freed from the physical, procedural and economic constraints of the latter. By exteriorizing and materializing the mental representation of the intended outcome, conversely, the anticipation of the final artifact is freed from the limitations of human imagination and memory. A design representation thus can be understood as the result of a twofold and inverse division and delegation – it is the hybrid of the image of an idea and the prefiguration of a purpose, acting as a true proxy of both.

Jones himself emphazises four main and interrelated ways in which the introduction of design representations changes the processes of artifact creation:[10] Firstly, the specification of the artifact's properties in advance of production enables coordinating and splitting up the production work into independent tasks that can be carried out by different hands and increases the rate of production, additionally so by at the same time limiting the need and leeway for spontaneous variations (i.e. the characteristic cutting and fitting procedures of craft production). Secondly, the steadiness and clarity of an external representation allows the designer to oversee and accordingly plan and lay out the details of larger and more complex artifacts in a consistent manner. Thirdly, the possibility of varying multiple aspects of a form at the same time, the more so at a much reduced cost in terms of both time and materials used, largely increases the opportunity for and thus the rate of innovation. Lastly, on the other hand, the remoteness of the designer from the processes of production and their affording of direct material feedback introduces a new degree of uncertainty about the feasibility and validity of the outcome that has to be compensated for by experience and auxiliary methods of prediction.

It should be noted, though, that neither of these aspects alone marks a neccessary and clear distinction between the procedures of craft design and design-by-representation.

The problem of the uncertainty of the outcome, as we have seen, also applies for craft processes and can be considered a general feature of all poietic activities. What changes with the use of design representations, of course, are the means and methods of prediction. When conceiving of new forms, the availability of a steady and manipulable representation of the intended artifact even partly and at times greatly compensates for the lack of direct material feedback. Additionally, as David McGee explores in more depth[11], the modern development of measured multiview plans together with advances in mathematics and physics allowed for the scientific treatment of increasingly complex predictive problems by way of calculation – a development that continues down to this day and has reached hitherto unknown heights since the advent of computer-aided design methods. Design-by-representation, however, also creates another predictive problem in its own right that is more directly related to the problem of representation. I will get back to this in a minute, but let us first quickly consider Jones' other points:

The inventiveness of the respective procedure, regardless of the open question of how it might be measured or compared, does not constitute a clear-cut distinction between craft and representational design practices, either. A craft process, on the one hand, is only practically, but not by principle, limited in the degree of formal variation it creates while nothing, on the other hand, prevents the use of design representations to merely reproduce an already existing form. The distinction between originary and reproductive poietic processes runs transverse to the distinction between craft design and design-by-representation and is one of degree and aspect of consideration. The production of large and complex artifacts based on well-coordinated division of labor, lastly, also occurs within craft traditions. Actually, such complex artifacts as ships have long been constructed collaboratively without the aid of prior visualizations.

The distinguishing attributes of design-by-representation versus craft processes identified by Jones still largely hold true by relative comparison, though. This becomes especially clear when looking at their cumulative effects: Conceiving of and effectively realizing, based on the division of labor, a new and complex artifact that is not the instantiation of an established craft type – such as a unique representative building – can, in fact, be considered practically impossible without any use of design representations. Factors like the capacity of generating and evaluating new forms unrestricted by physical limitations or the ability to control and coordinate production processes for which no prior technical script has evolved within the existing craft traditions should thus be seen, not as neccessary criteria, but as decisive techno-economic motors and effects of the historic development and employment of design-by-representation techniques.

The defining factor in the history of design processes that governs all of these other factors, however, seems to be the problem of *translation*. To understand this problem, it might be worthwhile taking a closer look at the pragmatic structure of a single representational design act. Each such act is constituted by the complex interplay of what for analytical purposes, though, can be described as three distinct layers of action.

Considering these action components under a pragmatic perspective means focussing on their specific effect or sense (their implicit »telos«, if you will) within their respective context: On the first layer then, we have the primary poietic act of materially producing the representation itself. Its purpose consists in the bringing forth of more or less durable, physically present *traces*. The synthesizing apprehension of these traces as (a.) *signifiers* or *image carriers* that via a given code or perceptual scheme present or articulate an absent meaning or content or (b.) as elements of a *language* or *image game* whose sense consists in their conventional operative application within the respective symbolic or iconic use context – this apprehension constitutes a second layer of action. Even though such apprehensions or perceptions by which forms reveal a content, signify a meaning or acquire a symbolic or iconic usage are often carried out involuntarily, they are still activities of a situated observer. Emphasizing their status as actions thus accords for the fact that the interpretation of the traces produced on the primary level of activity may vary from observer to observer and from moment to moment and can be a function of the intention of *making a certain use* of the representation as a whole. It is here that in an act of design-by-representation a third layer of action comes into play, insofar as the representation is not just apprehended as a representation of something that may or may not factually exist, but rather of something that is perceived as the possible result of a secondary poietic act in the future. The third layer, hence, is that of an *anticipated* action, in which the result of the primary act (the material design representation) would act as a model for realizing that which it represents. Not a mere representational scheme, but this *practial future act of translation* constitutes the horizon of possibilities within which every designer or design procedure operates.

It should be easy to see now that every act of design-by-representation has a constitutive *poietic mediality*, if by »poietic mediality« we understand the space of possibilities within a given representational procedure to effectively bring about future artifacts by creating representations of them. This *primary* or *technical mediality* of a design representation is *not* a symbolic or iconic one, it is, at its core, one of *causation*. It is determined by the actual processes of information transfer that take place between the representation in question and the realized artifact (most often, I should note, through a chain of intermediate representations and translational steps). To see this mediality in effect, one would have to ask: What aspects of the form of the material design representation will in which way have affected the form of the resulting artifact once it is realized? Since the agency of this primary mediality is only ever actualized *after* the design representation has been made, a *secondary, symbolic mediality* is in effect during the act of designing itself: That is the mediality of the translational or representational scheme that the designer *assumes*. In design, thus, the theoretical problem of the difference between representation and the represented becomes the practical problem of the difference between the supposed scheme of translation from design to artifact and the actual, but future, and thus as of yet uncertain translational procedure.

These transfer and translation processes that determine the effective, technical mediality of a design representation may or may not in a given case involve perceptual interpretive acts by humans and other sources of indeterminacy. In abstract terms, they can be conceived of as the cumulative performance of a heterogeneous *network*, be it the network of masters and assistants, tools, working materials and geometrical projection and physical transfer techniques in a Renaissance workshop setting[12] or the *infrastructure* of a digital design and production technology[13]. The history of design as a cultural technique then, to conclude, would fundamentally be the history of the development of these networks and the amount or type of control and expectability of the outcomes of production they bestow upon the designers.

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[1] See Aristoteles, *Nikomachische Ethik*, I 1, 1094a; VI 4, 1140a; VI 5, 1140b.; see also Ralf Elm, »poiêsis / Machen, Wirken«, in: Ottfried Höffe (ed.), *Aristoteles-Lexikon*, Stuttgart 2005, pp. 469–471.

[2] Design, in this perspective, emerged during the Industrial Revolution when early industrialists like the English ceramics manufacturer Josiah Wedgwood at around 1750 began to employ special artistically trained »modellers« to create prototypes and moulds for series manufacturing, thus both rationalizing their production processes via the division of creative and productive labor and adapting to the stylistic and expressive demands of a modern consumer market, cf. Adrian Forty, *Objects of Desire. Design and Society since 1750*, London 1986, pp. 29–41.

[3] For theorists like Harold Nelson and Erik Stolterman, design activity is nothing less than a, if not *the* defining anthropological trait: »As human beings, we continuously create things that help form the basis of the world as we know it. When we create these new things – tools, organizations, processes, symbols and systems – we engage in design.« (Harold Nelson/Erik Stolterman, *The Design Way. Intentional Change in an Unpredictable World. Foundations and Fundamentals of Design Competence*, Englewood Cliffs, New Jersey 2003, p. 1.)

[4] David McGee, »From Craftsmanship to Draftsmanship. Naval Architecture and the Three Traditions of Early Modern Design«, in: *Technology and Culture*, Vol. 40, No. 2 (Apr., 1999), pp. 209–236, here: p. 213.

[5] The term »representation« is sometimes used to imply a merely additional or post hoc *re*-presentation of an otherwise already independently existing entity (i.e. the represented), which obviously would be a faulty understanding of how design representations work. Rather than describing, depicting or reproducing something that already exists, a design representation is, in fact, the locus where the form of the represented is first of all manifested and realized. The representation, in this case, informs the represented and not the other way around – the former is both logically and temporally prior to the latter. It should therefore be noted that, in the following, the term »representation« is merely used as a general way of signifying *that which (to a given observer) stands for another* without making any assumptions about the ontological order of the two relata.

[6] See John Christopher Jones, *Design Methods. Seeds of Human Futures*, London 1970, pp. 15–24.

[7] See McGee, pp. 214–216.

[8] Jones, p. 19.

[9] Ibid., p. 18.

[10] See ibid., pp. 20–23.

[11] See McGee, pp. 227–234.

[12] Cf. Bernhard Siegert, »Weiße Flecken und finstre Herzen. Von der symbolischen Weltordnung zur Weltentwurfsordnung«, in: Daniel Gethmann/Susanne Hauser (eds.), *Kulturtechnik Entwerfen. Praktiken, Konzepte und Medien in Architektur und Design Science*, Bielefeld 2009, pp. 19–47.

[13] Cf. Daniel Cardoso Llach, *Builders of the Vision. Software and the Imagination of Design*, New York 2015.