Experimental Design

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Today, we ask architecture to enrich, protect and serve human life. Architecture must be emotionally captivating, functionally and financially optimized and environmentally performative. The complexity of the built fabric rises and the field of knowledge needed to construct a singular building expands. We know that tailoring above requirements together from the beginning of a design process improves all aspects of the final design from its construction process throughout its lifetime. This more than indicates that disciplines need to meet and interweave.

Just as Jørn Utzon was a master of merging architectural ideas with engineering principles to elevate numerous projects, so could contemporary architectural practice become more than the sum of the disciplines.

Utzon(x) as a lecture series and summer school ask architectural and design actors for approaches, methods, models and projects that attempt to construct architecture from the merged platform of architecture and engineering. Utzon(x) is an open discussion of how both academia and practice can move towards a built environment that is beautiful, social and environmental responsible at the same time.

A way of working with architecture more than a style of architecture might offer some grounds for this effort. Architecture is according to architect and psychologist Bryan Lawson (Lawson, 2006) a prescriptive activity. That is, prescribing something that does not exist. It reaches out to something yet to be discovered and understood. Architectural endeavors are therefore often associated with a search, however, seldom with the extension and extended meaning of re-search. At least in terms of scientific truths in the way they are understood in the natural and engineering sciences through establishing guiding laws and principles. Situated between humanistic and natural sciences, architecture lends methods of search and knowledge inquiry from various disciplines often facing the need to argue in both quantitative and qualitative ways. While means for 'measuring' if something is 'new' or 'improved' are important to evaluate progress in the work performed, modes of inquiry for new knowledge in architecture might lie closer to the actual workings of the classical researcher than immediately understood. Alan Penn (REF), architect, researcher and educator, points to the philosopher of science Ian Hacking, who argues that the nature of research is not only the testing of hypotheses, but also that of phenomena creation. In the process of creating phenomena, we will be able to understand abnormalities and potential fields of further research undertakings.

Advancing knowledge through phenomena creation lies close to the core activity of prescriptive activities in architecture particular through physical models and digital models that includes simulated physical conditions. It does so, as material and spatial phenomena are perceivable and influenced by the actual world.

In parallel, we know from investigations of design processes that the greatest leap forward towards an improved design (and potential understanding) is created by a rapid successive process of *analysis-making-synthesis* (Akin & Lin, 1995). This is a solution based process, typical for designers, whereas scientists and engineers typically have a problem oriented approach in which they try to figure out the problem before engaging with the process of search (Lawson, 2006). An advantage of the solution-based approach is that it constructs intended and more importantly unintended phenomena.

According to architectural theoretician Michael Speaks (Speaks, 2007), the iterative process, based on prototype making, is the gateway to what he refers to as *Design Intelligence*. This is, an accumulated understanding of design aspects that can be classified as knowledge. However, for this to happen, the process needs to include registration of the conducted iterative process in order to trail both confirmation and abnormalities produced during the searching iterative design process. We can here raise a potential critique or question in what way this can be applied, as how are we to understand in what direction to make design iterations to become more knowledgeable about a design problem?

Studies into classification of experts in various fields, such as music and sport might help us to understand how we can do this. By documenting the transition from being good to becoming excellent, researchers (Ericsson, Krampe, & Tesch-Römer, 1993) have discovered that a quantity of training hours has to be parsed. More specifically, 10.000 hours of training. This in itself is a substantial effort, but perhaps more important, the training needs to be what the researchers refer to as 'deliberate practice'. The expert musician is not playing an entire piece, but often deliberately practicing fragments or scales enhancing a certain skill. The hundred-meter sprinter is not just running, but working particular muscle groups far away from the straight running course. This process of 'deliberate practice' enhances the skills and knowledge of the performer. Interestingly, studies of elite designers show that they too take an approach where they focus on specific aspects, noted 'primary generators' (Darke, 1979). These 'generators' are the core elements in producing both design solutions and design knowledge.

Just as good designers apply generators to their design processes, so could academic educational design teaching potentially advance through such methods. Such design education process was initiated with a group of architectural design students, by one of the authors, where a series of successive generators where applied in progressive phases of design development. First working with a geometric element, then to understand the elements properties as a system of multiple elements, to lastly create formations based upon the learning from the first two phases (Foged, 2012). The final designs followed by this method became often geometrically advanced, but through continuous registration and documentation of the process, an understanding of a complex architectural system could be maintained and stored for further work. The process generated accumulated design intelligence and knowledge by the student.

While the usage of prototypes in modern architecture is relatively new, we find direct similarities to the work methodology as previously described of Jørn Utzon. On several projects he worked this way, as we can see in the prototypes developed among others for the tiling of the Sydney Opera roof. The conventional separation of thinking and making, architecture and engineering, is discarded in favor of a design process that involves both at the same time.

Similarly, in the design development of the layout of the Kuwait National Assembly (1982), it appears that Utzon creates a design sketch that he can operate within, make variations and understand its capacities. In this, he sketches simple units. These units are then organized in clusters and finally in a greater building complex. The ability to have control of each unit, cluster and total organization seems to enable design maneuverability of several design scales simultaneously. Perhaps this is one of the reasons why Utzon is known for creating architectures in direct relation to the human and the iconographic expression at an entirely different scale.

In this sense any model, any prototype, is not a final result but a medium for the next iteration. It is in this way a keeper of what we know in this moment. Hence, a 'final design' is not the total result, but is much more the entire learning and knowledge created through 'making-analysis' iteration by 'making-analysis' iteration usable when approaching other design problems.

Following this approach, the summer school attempts to create a working methodology that is search oriented, based upon shifting modes of physical and digital making to spatial, structural, environmental analysis to synthesis to both create a design result and a growing design intelligence by weaving architecture and engineering.

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> Progressive transformations and the backtracking of an architectonic development
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