

Modulated modularity – from mass customisation to custom mass production

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The idea of mass customisation is as old as digital technologies and computer aided manufacturing – as is the idea that consequently our environment could also be tailored to individuals’ needs. Subscribing to that ideology, digital architecture has up until recently relied on fabrication of an abundance of unique elements. Testing these ideas in industrial manufacture though has still proved problematic. Early digital architecture didn’t change construction, rather through automation could merely put more effort into producing more extravagant forms, often ending up creating a logistical nightmare.

Designers of the second digital turn are trying to overcome this discrepancy between construction methods and algorithmic design that is pursuing heterogeneity, sustainability, democratisation of construction etc. Automation depends on standardisation rather than endless variation. Towards such ends a much better suited approach, rather than mass customisation, could be custom mass production. Using contemporary means of production the *objets-type*, the standardised modules, can be a lot more complex than their modernist predecessors, have a lot more intelligence embedded in them.

My research is looking at dynamic geometric systems of modulation that depend on realities of production and produce architectural effect. The approach I have developed for subdividing volume (mass, surface, lattice) is modulated modularity. The term suggest an algorithmic play on, or rigorous modification of modularity. The classical tool of modularisation has been the grid – a static array of axes. Algorithmic means of design allow us to look at the grid not just as a less constrained periodic

subdivision of space but as a design tool that is dynamic, adaptable and allows for subjective intervention.

Modulation, a term most often connected to music, also raises questions of proportion, rhythm and the relation to the human body in architecture. This in turn could be considered another reasoning for digital architecture to turn from the continuity of calculus to the granularity of data. Modern architecture has often been criticised for the lack of the human scale. The new rise in discrete tectonics, connected to automation of assembly, could also be a return of the human scale. Rhythm is the discretisation of our environment in space and time. Just as we discretise sounds that we make into syllables to manage the noise of the signal, we're dividing our environment to comparable parts to understand and communicate it. Proportion and rhythm therefore are tools for making our environment relatable.

Using algorithmic design we are bound to be a lot more precise about following the regulating lines of our automated designs. This in turn will create an opportunity for the emergence of the other. We are able to set up simple algorithms - rulesets that define relationships within our designs - that then start to govern the design space. In addition, we can set parameters inside those governing algorithms that can be changed on the go, based on qualitative or quantitative feedback, creating a possibility for subjective manipulation of this automated processes, which creates a duality of human nonhuman interaction.

This paper looks at three main aspects of my creative work. Firstly it is situated within context of algorithmic design due to its dependence on rule-based automation in design, fabrication and assembly and more importantly its fascination with emergence and *the other*. Secondly the work is conditioned by industrial fabrication and a non-speculative approach to construction, therefore depending on an analysis of the current affordances of *the real*. Thirdly the emergent language of modulation has historical precedents in proportion, rhythm and architecture's relation to *the body*.

Keywords: algorithmic architecture, automation, digital architecture, fabrication, modular architecture

Short bio

Siim Tuksam is an architect, founder of PART - Practice for Architecture, Research and Theory. He has an M.Arch. with distinction from University of Applied Arts Vienna, Studio Greg Lynn, and has gained experience at the Southern California Institute of Architecture and a number of architecture and design offices. He is currently PhD fellow and junior researcher in Estonian Academy of Arts.