POSITION PAPER RESEARCH METHODS – Critical Reflection on the Hyperbody Studio

By Roel Westrik – 4229908 – May 16, 2017

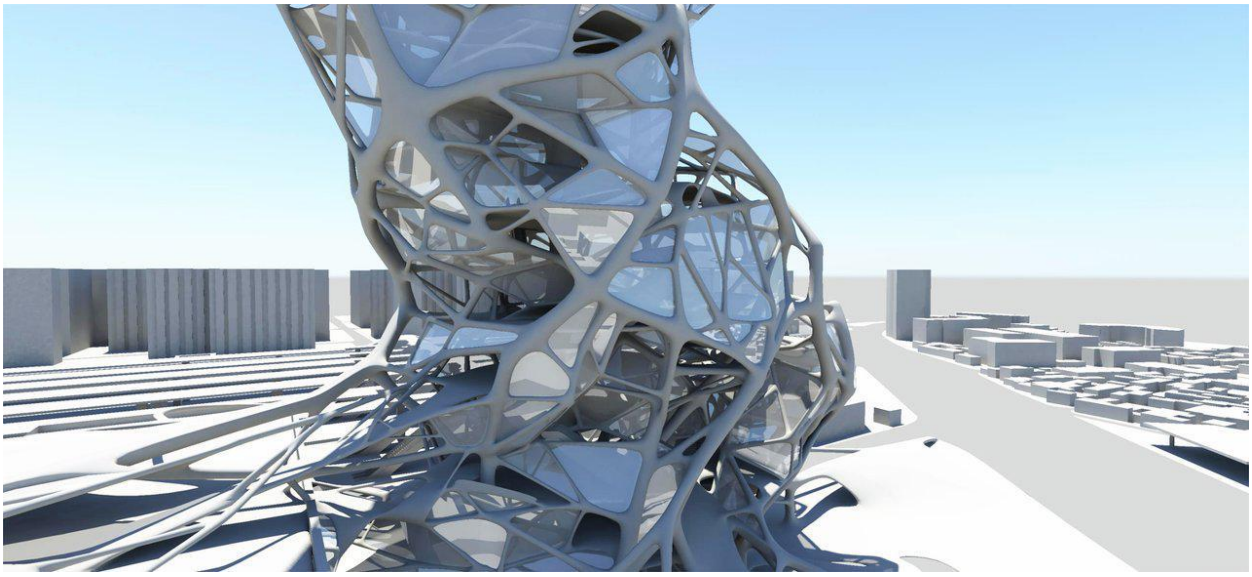

Fig. 1: Mixed use tower, proposed by Nimish Biloria, former researcher at the Hyperbody studio

The Hyperbody studio was built by Kas Oosterhuis, architect at ONL Architects and professor at the Faculty of Architecture at the TUDelft. There, he established the Hyperbody studio for master students, as well as the protoSPACE laboratory, where students and tutors can participate and contribute to his research for design and engineering. (Oosterhuis, 2011) Oosterhuis (2003, p. 55) describes the Hyperbody studio as follows: *"[...] for the theory and praxis of the hyperbody, responsive architecture is not the ultimate goal. True hyperbodies are pro-active bodies. True hyperbodies actively propose actions, they act before they are triggered to do so. Hyperbodies display something like a will of their own. They sense, they actuate, but essentially not as a response to a single request. They sense and actuate because some internal force is driving them, hyperbodies are data-driven constructs. Information flow is the driving force making the hyperbody tick."* While Oosterhuis speaks of design outcomes, rather than a research methodology, the philosophy of the studio is clear in his statement. Yet, it is not the extravagant designs that set the studio apart from other studios, however unique they may seem (fig. 1). Rather, it is their unique way of thinking that sets the studio apart from others. For the hyperbody studio, research in the field of architecture may be the most essential element, even more so than the design outcomes students seem to be so interested in – ONL is appropriately called the 'innovation studio', rather than the 'design studio'. In this paper I will reflect upon the philosophies and research methodologies of the Hyperbody studio at the faculty of architecture at the TUDelft. I will analyze their ideology and intentions as well as any flaws that need to be brought to the light.

"Research is based on the will to weave actual technologies into daily practice. A student and a professional must spend sufficient time on the hands-on research of new building processes. They must experiment with new elastic materials. Do not think of alchemizing

different materials in a traditional clash of materials, but think of experimenting with production processes, and with the file to factory process [...] Research must not be speculative, but based on immediate practical possibilities; never before done, but immediately feasible." Oosterhuis (2003, p.7) explains how he expects both students and professionals to conduct research in the field of architecture. Three aspects seem to get emphasized by Oosterhuis: pro-activity, innovation and tools, and materiality. Accordingly, these are the aspects I will explore – though for the purposes of this paper, I will omit the element of pro-activity.

To get a better understanding of the philosophies, we must place their elements in historical context. To see how the studio claims to be innovative, and research for the better of the future, we must see how similar attempts have been made in the past. A very important similarity of philosophy can be found in the late 19th, early 20th century, where mass production had first been made possible and feasible by the industrial revolution. (Benevolo, 1977) A boom in the build environment caused by technical innovation proved to be a solution for the exponentially growing population, in the form of mass produced housing blocks and buildings. This is where the first mass produced, fabricated elements could see the light of day. Mass production has been continued and improved upon in the built environment to this day. However, Oosterhuis (2011, back cover) summarizes that the field of architecture experiences a paradigm shift as he explains: *"Non-standard architecture is bespoke architecture. The building of today is designed with digital tools and is produced by means of digitally controlled production methods. This leads to a revolution in the conception of the nature and realization of the design. [...] Two paradigm shifts take centre stage: from architecture based on mass production to architecture based on industrially produced made-to-measure components, and from a static architecture to a dynamic and interactive architecture."* His visionary philosophy regarding technical innovation in the field of architecture is very clear. We are ready for a revolution – the next step in the evolution of architecture.

The second element, materiality experiences a second-hand revolution as well. Innovation has led to a new way of looking at materials. (Fernandez, 2006) Materials have always been examined by their unique properties, and were used accordingly. Where one material may lack in one of its properties, the clever combination of more materials may prove to be a solution. For example, concrete is a very durable material, and handles compression forces very well, but tensile forces not as much, so we can enforce it with steel, which makes sure the concrete does not strain too much under tensile force. However this way of looking at materials individually is undergoing a revolution as well. *"Architects have, in the past, repeadetly stated their own views on the appropriate use of certain materials in terms of their generalized properties. Whether a material has a grain, or originates from inorganic or organic sources, is highly processed or relatively untouched – this is the language of a good deal of the discourse that attempts to formulate the nature of materials in architectural assemblies. [...] Textural qualities tend to obscure, or at least diminish, the importance of material properties."* Fernandez (2006, p. 8-9) explains how architects have grown used to looking at materials indivudually, and as a result tend to look at irrelevant characteristics, disregarding their essential properties.

Fig. 2: Whale Jaw, bus stop by NIO Architecten (2003), Hoofddorp, the Netherlands

The material revolution can be shown with the Whale Jaw in Hoofddorp, by NIO Architecten (fig. 2). (Castelijn, 2011) This design is unique both in its shape and its use of material. The 50 meter long construction was made with a single composite material, a combination of resin and fiber reinforced polyester. No individually freeformed panels where needed to the assemble the bus stop. As Oosterhuis (2011) has persued for so long: it is no longer "*a traditional clash of materials"*, each doing what it does best, but rather a composition of materials acting as one whole body. This revolution, from assembly to lamination, has already been proposed by Greg Lynn: *"My personal use of the term 'chemical' is against the term 'mechanical', and it expresses my preference and desire to celebrate glued, bonded, and welded methods of assembly in favor of fetishism of mechanical attachment. Cars, planes, sporting equipment, even appliances have jettisoned crude mechanical hardware in favor of glued joints, and it is really only architects that still get excited about a nut and bolt today". (Lorenzo-Eiroa, 2013, p. 289)* Lynn notices how the field of architecture has been lagging in the research of materiality compared to other industrial sectors. The Whale Jaw by NIO Architecten is a prime example where the field of architecture is finally catching up. However, with this arises the conundrum: is the choice of material cause for the choice of shape, or was the materiality a simple necessity to create a complex shape? Do we choose the material because we like it or the possibilities it provides? In other words, are we really better of than the scenario painted earlier by Fernandez? This may seem like a question of personal preference and design rather than reserach methodology, but as he himself has noted: *"The emergence of novel technologies has always held a central place in the creative efforts of designers. [...] The materials of architecture have always been pivotal in the development of its form and the implication of*

future form. [...] some of the primary developments in architectural form have been prompted by the introduction of new materials." (Fernandez, 2006, p. 7) Maybe materiality has become neither a necessity nor a personal preference, but a playground for architects, to have the opportunity to experiment and find new improvements for the build environment.

Materiality has become one of the most disputed elements of the profession. The impact our species has had on the health of our planet has been increased drastically over the last decades. The build environment, and more specifically, the process of building it from the matter we take from the earth is one of the greatest burdens we can bestow upon the planet. To quote Fernandez (2006, p 6-7) *"Today, improving the environment requires a reconsideration of the contribution of new materials in this process. One such issue is the relationship between the production and consumption of materials and the service lifetimes of buildings. The material reality of typical buildings is not the static and unchanging permanence that monumental architecture aspires to. Yet, buildings do constitute an enormous store of materials used in construction – primarily due to their long lives. Understanding and designing within an organized ecology of the built environment, and not just for a single project's needs, requires more information about the material flows for construction. Therefore, the ecology of the built environment becomes one aspect of the study of materials for buildings. Buildings are among the very largest and most complex artifacts that our species has ever produced. The sheer size, weight and volume of many buildings are far larger than the vast majority of other modern industrial artifacts. The construction of these buildings, their long lives and their aggregation into enourmous cities has permanently altered the earth's landscape. The modern city is the largest accumulation of materials and harnessed energy ever assembled. It is estimated that our cities, past and present, existing and dissolved have toghether consumed and retained upwards of 75 percent of all materials ever extracted by humans."* In other words, it is absolutely essential that we reflect upon the impact architecture has on the planet, and, as a cause, what responsibility we as architects have to both the persevation of our species and our habitat, for not only our generation, but those ahead as well. This asks for a certain awareness from the architect.

This awareness is not something unfamiliar to the Hyperbody philosophy. The three main ingredients (if you will) to the philosophy, pro-activity, innovation and materiality, lead to the simple idea of optimization. Architects and researchers at the Hyperbody studio do not shy away from using tools from the field of ICT. Software such as Rhinocerous and the Grasshopper plugin provide the (student) architect with the tools needed to generate complex shapes – unimaginable to architects from other studios (fig. 1). Oftentimes, these shapes are not a mere outcome to the personal preference of the student, but an optimized outcome to a set of rules processed by the computer. Exactly this idea is the kind of research methodology, which is trusting innovation, rather than personal bias or imitating master architects, that makes the Hyperbody studio unique. As for materiality, this idea of optimization translates to "material only where material is needed", a phrase often heard in protoSPACE. The file-to-factory proces as proposed by Oosterhuis is practiced intensely by students and tutors alike. An ABB robot arm has been purposely placed for students to practice what the tutors preach (fig. 3 & 4).

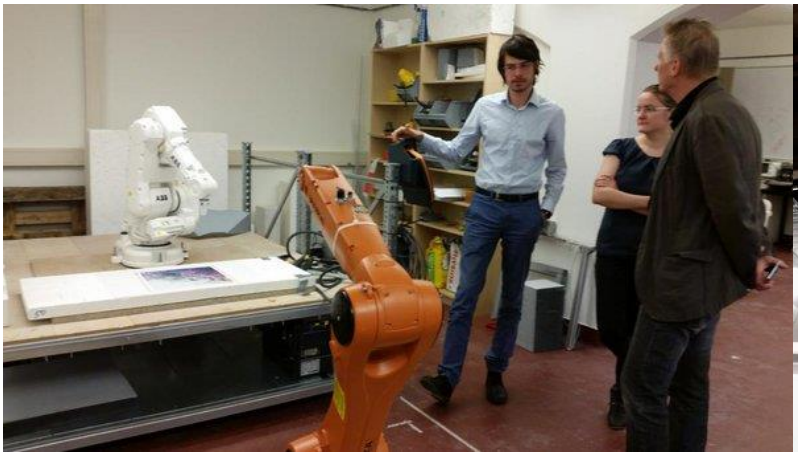


Fig 3 (left): Researchers at the Hyperbody studio inspecting the ABB robot arm at protoSPACE

Fig 4 (right): Informed Porosity, designed by former Hyperbody studio students

It may all seem too good to be true. While the studio has strong philosophies, it oftentimes falls short in those same promises. Technical innovation can used as a powerful tool to generate alien-like architecture, but it is not the be-all and end-all. In the end, what may (unfortunately) matter more is a personal preference towards visually unexpected architecture, rather than actually optimized architecture. I stated earlier in my paper that architects in the Hyperbody studio are not affected by personal taste or style, but I can't be a coïncidence that all designs from the studio look somewhat familiar. All architects have their personal taste and signature style, as stated by Lynn (2005) in a TED-talk: *"[...] we have to design things which are coherent as a single object, but also break down into small rooms and have an identity of both the big scale and the small scale. Architects tend to work with signature, so that an architect needs a signature and that signature has to work across the scale of houses up to, say, skyscrapers, and that problem of signatures is a thing we're very good at maintaining and working with; and intricacy, which is the relationship of, say, the shape of a building, its structure, its windows, its color, its pattern. These are real architectural problems."* Lynn may stumble a little bit in his words – it was a live presentation – but I think his intentions are clear. 'Zaha-hadidism' and renderporn are the enemies of the research methodology of the Hyperbody studio, and unfortunately have not been defeated yet. We have to be careful to net let personal taste in alien-like or *cool* architecture cloud our view and aspirations, as we have the tools and knowledge to work towards a better future.

SOURCES

Benevolo, L. (1977). History of modern architecture (Vol. 2). Mit Press.

Castelijn, T., Stouffs, I. R., & Schipper, I. H. (2011). Self-supporting sandwich element for freeform building envelopes.

Fernandez, J. (2006). Material architecture: emergent materials for innovative buildings and ecological construction. Taylor & Francis.

Lorenzo-Eiroa, P., & Sprecher, A. (2013). Architecture in Formation: On the Nature of Information in Digital Architecture. Routledge.

Lynn, G. (2005, February). Greg Lynn: Organic algorithms in architecture [Video File] Retrieved from https://www.ted.com/talks/greg_lynn_on_organic_design (12-05-2017)

Oosterhuis, K. (2003). Hyperbodies. Springer Science & Business Media.

Oosterhuis, K. (2011). Towards a new kind of building: tag, make, move, evolve. NAi.

LIST OF USED FIGURES

Fig 1. From: http://static.wixstatic.com/media/cfcab63b0a458f5e68c923d5cee5bbe0.wix_mp_1024 (16-05-2017)

Fig 2. From: https://www.e-architect.co.uk/images/jpgs/holland/amazing_whale_jaw_nio090409_rb_1.jpg (16-05-2016)

Fig. 3 From https://pbs.twimg.com/media/CHU1GiNVAAAcq7g.jpg (16-05-2017)

Fig. 4 From https://s-media-cache-ak0.pinimg.com/736x/37/e1/f9/37e1f9ab5e957f4dee1766dd883cbde3.jpg (16-05-2017)