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Tectonic Learning Ecologies: Elements for a circular architecture pedagogy in the work of Fernando Távora

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ABSTRACT: The increasingly pressing environmental challenges that govern us entails a necessary questioning of the role of architecture in a viable development of the built environment as a whole. Leading economic and environmental research points to the fact that an addressing of these challenges calls for holistic design approaches as expressed in the concept ‘circular economy’. Within architectural research, this concept has recently been associated with a tectonic practice that inscribes future architectural construction in a mutual and ecological cohesion with its past. Present paper continues this research effort by studying the implications and potentials hereof from the point of view of architectural education. This by proposing a link between the presence of tectonic thinking in architecture and the pedagogical challenge of sustaining architectural knowledge over time. The work of Fernando Távora, who conceived of the architect as a lifelong pupil and educator, serves as a case study investigating this link.

1 INTRODUCTION

The environmental challenges that govern us, such as climate changes, increased migration toward urban areas, shortage of materials etc. entails a necessary questioning of the role of architecture in a viable urban development (UN 2014, UN 2015). This condition outlines an increasingly complex field of practice for the architect. Leading economic and environmental research points to the fact that, in general, an addressing of these challenges calls for holistic design approaches as expressed in the concept of a ‘circular economy’ (Ellen McArthur Foundation 2018, Webster 2017). This circular perspective juxtaposes a series of emerging interdisciplinary schools of thought all rooted in ecological thinking, such as ‘cradle to cradle’ and ‘natural capitalism’ (Webster 2017, p.11-23). Quoting complexity economist Eric Beinhocker, Ken Webster defines a circular economy as one ‘*that is restorative by design, and which aims to keep products, components and materials at their highest utility and value, at all time*’ (Ibid., p. 17). Within architectural research, this call for circular thinking reflects in an emphasis upon the need to develop a circular approach to the much-debated question of sustainable construction practice. Consequently, emphasis is on development of specific strategies for implementation of life cycle analysis, design for disassembly, reuse- and upcycling principles etc. (Crowther 2005, Nordby et al. 2008). Within the Danish context alone, this research results in a series of research by design experiments aimed at investigating the practical implications of a transition to a circular economy for architecture (Jensen & Sommer 2016, Vandkunsten 2017, CINARK 2018). These experiments demonstrate the business case for such transition and stress the technical significance of construction in this matter. However, they also exemplify that such transition implies orchestration of a series of complex questions concerning our conception of ‘value’ in architecture. Questions that go far beyond the calculation of for example energy-use or even costs as such, but rather depend upon a nuanced cultural understanding of architectural space and its

ability to support and enrich everyday life. Most recently, addressing of this question of ‘value’ has been associated with the development of a tectonic practice in architecture that inscribes future construction in an ecological cohesion with its societal, physical and cultural context and past (Nordby et al. 2008, Beim et al. 2015). As a branch of architectural theory, tectonics has been applied and developed throughout history as a critical means for debating the nature of the work of the architect and in particular the role of technology in the creation of architectural space, hereby placing construction as a focal knowledge for the architect as outlined by Frampton (Frampton 1995). This development can be traced from the earliest references to the Greek *tekton*, into responses to the emerging industrial revolution by Karl Bötticher and Gottfried Semper, over the postmodern reintroduction of the term by Eduard F. Sekler, Marco Frascari and Kenneth Frampton and finally into a growing body of contemporary research on the topic (Foged & Hvejsel 2018). With the present ICSA mini symposium, calling for directions towards a ‘circular tectonic’ approach to architecture, this body of knowledge is suggested to be associated with circular economy. This association imply a need to move towards an increasingly multidisciplinary and collaborative understanding of architecture that simultaneously stress the role of construction in our conception of architectural ‘value’. This must necessarily reflect in our conception of the architecture school and our ability to sustain knowledge about the construction of architectural ‘value’ over time. Present paper responds to this challenge and seeks to continue the above outlined research effort towards transition to a circular economy in architecture by studying the implications and potentials of this transition from the point of view of architectural education. Hence, the paper studies the potential of tectonic thinking to the pedagogical challenge of establishing learning ecologies across time in a search for elements for a circular architecture pedagogy.

1.1 *Research Method*

In this search, the paper studies the current development in architectural education in relation to the call for circular economy. Here, the notion of tectonics form a critical lens through which to identify key pedagogical challenges in this process. Subsequently, the work of Fernando Távora, serves as a case study investigating the proposed link between the presence of tectonic thinking in architecture and the pedagogical challenge of sustaining knowledge about the construction of architectural ‘value’ over time towards a circular architecture economy. The choice of Távora is motivated in the fact that the particular context of the ‘Porto School’ and the role of Távora in its development offers a unique and well-documented possibility to trace architectural knowledge over time (Frampton 2007(1980), Fernandes 2015a, Lebre 2016). Looking into how Távora learned, how he taught, and the role of architecture itself in this education, the case study investigates the possible learning outcome of his work related to the challenges facing contemporary architectural education in the transition to a circular economy.

2 ARCHITECTURE & LEARNING IN A CIRCULAR PERSPECTIVE

The work of the architect often describes as a tacit knowledge, depending upon a deep-felt individual genius in the understanding of the quality of architectural space. ‘...*What is more important – architecture or learning?*’ Peter Cook asks in his contribution to the anthology ‘Educating Architects: How tomorrow’s practitioners will learn today’ that presents the teaching of a selection of acknowledged architecture schools (Peter Cook in Spiller & Clear 2012, p. 22). Cook, who ‘*will not be fobbed off with the response: ‘they’re both important’’*’ does not shake his hand when answering ‘Architecture’, and backs his argument in an exposition of a series of iconic examples of individual achievements of non-debatable architectural ‘value’ (Ibid.). Nevertheless, the answer to Cook’s question seems to be more complex than ‘either or’. This especially when considering the pressing environmental challenges that call for an increasingly interdisciplinary and collaborative understanding of the role of the architect implied in the concept of a circular economy. If taken as a condition, the concept of a circular economy defined as ‘re-

storative by design' stresses the complex contextual entanglement of the architectural discipline (Webster 2017, p. 17). It is my observation, that this raises questions about important dialectics in architecture between the icon and everyday architecture and between architecture and learning that needs addressing in architectural education. This not as a counter position to Cook's valuation of the iconic example and the will and genius of the individual architect responsible. Rather, as a critical means to employ this 'value' in addressing the challenge of embracing, affecting and improving the ordinary architectural practice by inflecting its messy entanglement with environmental issues, urban legislations, budgets, energy consumption, industry and developers. If superimposing the overall definition of a circular economy as being restorative by design, the main implication for architecture seems to be that of establishing a learning ecology that allows us to collaboratively sustain and grow architectural knowledge over time as a continuous construction. At a general level, it is a broad conception of economy as a fundamental entry to an understanding of the complexity of society, rather than as a specialist silo, that drives the community around the Ellen MacArthur Foundation in their research towards a circular economy (Ibid, p.11-23). It is my observation that the potentials and challenges of this movement within economy resonates in architecture, which inherently involves simultaneous 'valuation' of several ecological layers. In his account for a circular economy, Webster has searched the general implications hereof for education, as signified by a transition from schooling to education. Quoting former Professor of arts Sir Ken Robinson, he states that we have to move from a linear industrial manufacturing approach to an education '*based more on principles of agriculture*'. (Ibid, p.158). According to Webster, this implies a rebalancing of teaching and learning, '*since most real-life problems are contingent, 'solving' them is much more likely to be a cross-disciplinary effort*' why the pedagogical emphasis must be on '*opportunities for participatory learning and creative and critical thinking, above all*' (Ibid., p. 168). From the point of view of architectural education, this involves questioning the core of architectural knowledge itself as well as its ecological relation with other areas of knowledge. It is my observation, that a rereading of Távora's work can inspire us in this matter when he stated; '*before being an architect, the architect is a man, and a man who uses his work as an instrument for the benefit of other men and the society to which he belongs*' (Távora in Ortiz de Orueta 2016, p. 139). In architectural education, this entails an increased focus on our ability to transmit knowledge across generations, understanding architectural construction as a continuum. In broad terms, we need to increase our ability to value the beneficial quality of existing works and to embed this knowledge in future designs in order to grow our collaborative ability to establish complex ecological balances over time. This makes that of grasping and communicating the rapport between analysis and design a focal area of pedagogical emphasis.

2.1 *Building tectonic learning ecologies through a rapport between analysis & design*

It may be due to the inherently interdisciplinary character of the field of architecture that the task of analyzing existing works of architecture remains a complex issue. At a general level, architecture exists in a unification of immeasurable aesthetic qualities and a series of quantifiable technical measures. Symptomatically, existing architecture has throughout architectural history, been analyzed stylistically by means of an art-historian and aesthetic perspective. Likewise, from an engineering perspective examining its technical soundness, or from an anthropological perspective focused at use etc. However, it has been a recurring challenge to synthesize these multiple perspectives, a topic that I have discussed at greater length in (Hvejsel 2011, p. 74-84, Hvejsel 2018). If required, as implied in the movement towards a circular economy, to 'value' our work in relation to the general benefit of man, society and nature we need to be able to critically juxtapose, chose and reject several perspectives and circumstances when analyzing. This reflects in Távora's statement that the architect must so intensely know his circumstances '*...that knowing and being get confused. And he will have to reject the negative aspects of the circumstances and value the positive ones, which eventually means educating and collaborating... His stance shall, thus, be that of a lifelong pupil and educator*' (Távora in Ortiz de Orueta 2016, p. 139). This makes that of learning to analyze the choices made and positions held behind a work

of architecture beyond the physical gestalt of the work itself, vital. This point of view echoes in Webster's argument that the circular educational system '*will want to evolve to enable learners to grasp the 'habits of mind'... that enable effective 'whole systems' design*' (Webster 2017, p. 166). From an architecture pedagogical point of view, this means developing strategies that link analysis and design around a contextual understanding of architecture as complex spatial problem solving, rather than a formal or structural exercise as such. It is the idea of this paper that tectonic theory holds a particular potential in this matter as it refers simultaneously to a valuation of the built work itself and the work applied in its realization, offering a critical means to value means in relation to ends in architecture. In the writings of Sekler, Frascari and Frampton, this critical potential of tectonic theory in the rapport between analysis and design is documented (Sekler 1964, Frascari 1984, Frampton 1995). However, it remains rather unexploited as a pedagogical strategy addressing the current challenges of the general architectural practice in the rapport between analysis and design as argued in (Hvejsel 2018). Rather, the general application of tectonic thinking often remains a mere association of the term with the technique of construction as such. In 1996, Frank Weiner observed that our understanding of '*the differences and relations between the ideas of architectural history with those of architectural education needs to be developed to a far greater extent than has previously been the case*' (Weiner 1996, p. 504). He herein suggested application of tectonics in architectural education in a bridging of the recurring gap between history/theory class and design studio that Chad Schwartz has recently made a significant effort in filling (Schwartz 2017). Continuing this work further implies focusing at developing the student's ability to enter collaboration with previous generations in a rapport between analysis and design that position our work critically related to the current challenges of the general architectural practice. It is my observation that a perspective for such development of tectonic theory as critical pedagogical means is present in Frampton's seminal 'Studies in Tectonic Culture' when he stated that architecture; '*must of necessity become engaged in discriminating among different states and conditions... The tectonic presents itself as a mode by which to express these different states and thereby as a means for accommodating, through inflection, the various conditions under which different things appear and sustain themselves.*' (Frampton 1995, p. 23). Most recently, the notion of tectonics has been associated with the broad perspective of sustainability exemplified in the anthology 'Ecology of Tectonics' adding to this identifiable relevance of tectonic thinking in establishing learning ecologies across time in architecture (Beim & Madsen, 2015). This paper build upon this foundation and the identified potential of tectonics as a critical pedagogical means in architectural education using the work of Távora as a case study.

3 CIRCULAR PEDAGOGY IN THE WORK OF FERNANDO TÁVORA?

In the design of the department of Architecture at Universidade do Minho in Guimarães Fernando Távora and his son José Bernardo Távora have chosen to greet students with a firm yet welcoming spatial gesture. The main axis of the building lead us via a slight slope gently following the undulating landscape into a closed auditorium at the end of the main hallway. In the auditorium, the spatial grip tightens and we are invited to sharpen our attention. The square symmetrical plan, and high ceiling, makes the acoustic environment present at first seemingly blurring the purpose of the space as the setting of the first drawing course requiring full concentration. If anything, the experience of this entrance to architecture studies raises critical wonder: What can I learn from this particular sequence of spaces?

Learning: Fernando Távora himself was born in Oporto in 1923 as the sixth of seven children. In 1941, he enrolled at Porto School of Fine Arts, and as documented in the retrospective exhibition of his work 'Permanent Modernity', held in 2012 at the Universidade do Minho, his venture into architecture studies rapidly attained several parallel tracks (Banderirinha 2012). As he enrolled in the Superior Course of Architecture in Porto, ESBAP in 1945, he also started to work as an architect in collaboration with his brother the Engineer Bernardo Távora. In 1948, he

began to work for the Câmara Municipal do Porto and received invitation to participate in the Porto group of ODAM, Organização dos Arquitectos Modernos. In 1950, he started teaching and began to participate as part of the Portuguese representatives in CIAM and later TEAM 10 meetings. Already in these early years, Távora's emphasis on analysis as an integral part of architectural design referred to above, was visible in his valuation of the social role of the architect. As witnessed in his first paper published as early as 1947 'The Problem of the Portuguese House', Távora submerged with equal intensity in studies of the particular problems occurring in the local context as well as in outlook towards the concerns of international Modernism (Trizgueiros 1993). Several urban surveys made in collaboration with the local municipalities such as the Barredo Urban Renewal Study followed his analysis of the Portuguese House. Hence, Távora educated himself in the crossing of architectural research, teaching and practice through a deep and active involvement with his local context. As stated by Goncalo Canto Moniz 'Urban Surveys were successively looking to tighten the analysis mechanisms, to qualify the academic work and... make it available to society...' (Moniz 2017, p. 4). A series of travels abroad complemented Távora's intense local involvement. These including a roundtrip to the USA, Asia, Egypt and Greece in 1960. Together, the local and the global analyses led Távora to an integrated understanding of architecture and urbanism as a continuous construction that is of use as critical inspiration looking forward as we shall see in the following.



Figure 1. Universidade do Minho School of Architecture; sloping hallway and drawing auditorium interior. Photos from the retrospective exhibition of Távora's work 'Permanent Modernity' in 2012. Photo Credits: © do mal o menos / João Fôja & Eduardo Nascimento

Teaching: As stated above, teaching and learning quickly became interrelated modes of Távora's work that began to take shape as an understanding of architecture itself as continuous learning. This understanding opposes the conception of architectural heritage as safeguarding conservation, as well as a modern 'tabula rasa' approach. Instead, Távora conceived of architecture as a living urban construction in the service of everyday life. Regarding the challenge of establishing learning ecologies across time outlined in the introduction, the obvious evidence is of course Távora's Pritzker winning students, Álvaro Siza and Eduardo Souto de Moura. However, when investigating these individual successes deeper, a larger collaborative project surfaces in which the theories of Távora became a focal driver as documented by Eduardo Fernandes (Fernandes 2015a). In the years that followed Távora's formative studies, Porto School of Fine Arts got a separate school of architecture, and the approach of Távora mutually inspired in his surroundings and grew into a common project nurtured by individual positions. This collaborative project is visible today in Oporto and its surroundings counting three schools of architecture. As stated by Moniz, the teaching approach was 'intended to educate an architect with strong social and critical awareness, contrary to what is referred to in Portugal as a "wonderful-pencil-

architect” (Moniz 2017, p. 6). The joined focus of the group of teachers on urban surveys, combined with their involvement as consultants in urban renewal projects and the choice of several of them to focus their practice on social housing exemplify this (Fernandes 2015b). It is my observation that this emphasis on critical analysis as an entrance to design studio resonates in Frampton’s description of the tectonic as a means through which to inflect *‘the various conditions under which different things appear and sustain themselves’* (Frampton 1995, p. 23). Tavora’s built work exemplifies this as precise almost surgical repairs and additions that mutually respect and confront the existing urban construction. This is particularly visible in his work on the Municipal Park, Quinta da Conceição in 1956-60. Here, modern body-culture, tennis, become an integral part of the old monastery through the insertion of a series of small-scale elements that ‘reclaim’ the use of the park as a contextual joinery on multiple levels. Fernandes has referred this particular quality of Tavora’s work to his ability to value tectonic options in contextualizing architecture (Fernandes 2016). In Tavora’s own words this critical application of tectonic thinking is implicit when he stated that, *‘there were already elements to ensure, a structure to sustain’* (Tavora in Trigueiros 1993, 66). In the end, Tavora’s ability to engage critical yet empathetic dialogue with the monks as well as the Director of the port of Leixões allowed the insertion of these small scale spatial elements to eventually influence the large scale planning of the urban infrastructure of the port and vice versa.

4 DISCUSSION: ELEMENTS FOR A CIRCULAR ARCHITECTURE PEDAGOGY?

To my knowledge, Távora did not apply the notion of tectonics as such in his work and it is not the point of this paper to confirm or deny this. Rather, focus is upon whether the notion of tectonics applies as a critical means in illustrating the particular learning ecology that he managed to furnish, hence, upon whether the notion applies in learning from Távora. A recent course held at Universidade do Minho taught by Vincenzo Riso adds evidently to this hypothesis. In a publication documenting the course, Riso discusses the students’ works related to the pedagogical strategy of the course that asks of the students to ‘reclaim’ the use of Tavora’s renowned marketplace. In the studies, thorough analyses are intended for the students to *‘grow substantial and not just formal respect towards the existing piece of architecture, they are confronted with’* (Riso 2017, p. 179). Consequently, the students analyze multiple contextual aspects in relation; materials, history, space, construction technique, culture, use, users, economies, infrastructure etc. Tavora’s methodology of considering conservation and building as integral seems embodied in these studies. As the students are asked to ‘reclaim’ the market, the call for present relevance and everyday use is emphasized and ‘precise adjustments’ are valued over prominent ‘additions’ as expressed by Riso in his notes that witness a systematic pedagogical reflection (Ibid, p.180). This approach to architectural education echoes Tavora’s understanding of the architect as a man who understands his circumstances, emphasizing the social role of the architect referred to above. In his own research, Riso has connected this particular critical contextual understanding of the work of the architect with tectonic theory and practice understood as a joinery of technology and place inspired in the writings of Frampton (Riso 2008). Referring back to the potential outlined in the introduction for developing and applying tectonic theory as a critical method in architectural education, Riso hereby outline a significant perspective in this direction. This as he seeks application of Frampton’s proof, that the value of the iconic works by Jørn Utzon and Louis Kahn and others can be referred to the tectonic genius of their making, in relation to architectural analysis and design in general and in particular as a method in architectural education. Riso hereby addresses the challenge of establishing a didactic in architectural education that allows us to learn from iconic works of architecture and apply the knowledge extracted in more humble everyday practice. Hereby Riso expects students to *‘pay same defined attention to ordinary buildings, they will next work upon as professionals’*. And he conclude that; *‘all of the exposed, exercising about the refurbishment of a Modern piece of architecture could be considered among the distinguished didactic practices that could be helpful not only to preserve and foster that same architectural legacy, but also to question each own (teachers’ and learner’s re-*

spectively) thinking, positioning and acting.' (Riso 2017, p.181). Referring back to the call for an 'agricultural rebalancing of teaching and learning' implied in the transition towards a circular economy, it is my observation, that we can hereby begin to harvest elements for a circular pedagogy in architecture inspired by Távora's work. This in the form of a necessarily critical interest in our circumstances and the way in which previous architectural problems have been solved, unfolding a rapport between analysis and design in which the construction of architectural and urban space itself play a focal role in teaching and learning. '*A school of architecture? Have we managed to make the project of a building able to engage young students... to contribute to the improvement of spaces and shapes that involve, and partially determine, everyone's daily behavior?*' Távora asks himself concerning the design of the school in Minho (Távora in Banderinha 2012, p. 417). With the experience of the gentle slope and the present acoustic quality of the auditorium described above Távora address us immediately. He shows us how he has analyzed the landscape, how he learned from it and respects its inherent 'value'. Simultaneously, he does not shake his hand in undertaking responsibility for the construction of its future 'value' as a tectonic joinery of place and technology. Along the hallway, all the way into the auditorium the lower part of the wall is clad in warm glowing wood, detailed to the accommodation of touch, whereas the rest of the wall and ceiling appear almost dematerialized in its plastered whiteness. Inside the auditorium, the joinery of wood and plaster raises above our heads almost as if we are below the horizon line. When visiting the school in 2013, Vincenzo Riso told me that the students are only allowed to ascend to the studios above once they have completed a live-drawing course. What did Távora say about the architect? '*a man who uses his work as an instrument for the benefit of other men and the society to which he belongs*' (Távora in Ortiz de Orueta 2016, p. 139).

5 CONCLUSIONS

As an obvious point of critique, this paper seeks to relate seemingly distant research topics and timeframes. It enters the present call for transition towards a circular economy and study tectonics as a particular entrance to this challenge. Underneath this, it raises the question of the implications hereof for architectural education and studies the work of Távora in a search for elements for a circular architecture pedagogy. As a conclusion, it is a fact that each of these topics calls for further studies. However, the paper shows that these seemingly distant topics are related and importantly, that the general environmental circumstances governing us must necessarily reflect in the way we teach. With inspiration from Távora we may be able to readdress the question posed by Cook concerning architecture or learning and suggest that architecture itself is primarily a question of sustaining learning on many interacting levels. Távora has shown us that we learn when we are critically aware of our circumstances and that tectonic thinking offers a pedagogical means to remind ourselves of this. In a contemporary search for elements for a circular architecture pedagogy, this tectonic perspective on architectural education form a present call for further studies.

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