

The digital atrophy of classic architectural authorship

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Abstract

The paper examines the gradual shift that has occurred in architectural authorship with the introduction of digital intelligent tools that aid in the process of creation and production of architectural space.

By examining the nature of digital architectural design tools, starting from their very beginning, in the second half of the twentieth century, one can observe a certain pattern of transfer of both capabilities and decision, in the process of creation, from the designer towards the artificial intelligence of the machine. This transfer has rendered the software instrument, the driving will behind the power of the computer, into a veritable extension of the human intellect. This of course, has empowered architects, as well as other professions, to extend the reach of the architectural art and science to previously undreamt heights. The flipside to this monumental leap is the pushing of the traditional authorship of architecture into an irreversible process of atrophy. Conscious action is needed from the profession and from the architectural higher education institutions to tackle this problematic issue.

Keywords: architectural, authorship, digital, parametric, scripting, design

1. A short view of architectural authorship through history.

Recourse to the history of architecture and architectural design creation, besides a plethora of information important for the determination of artistic motivations, or for making statistics, reveals an important and relatively constant fact valid throughout the entire architectural chronology of mankind. The value of an artist and particularly of an architect, was recognized and preserved in a manner directly proportional to the said architect or artist's ability to protect his own special techniques and innovations. This protection was needed in the relation to the rest of the profession he belonged to and also in relation with the community he worked for. The disclosure of the technique behind certain architectural achievements, some famous throughout history, has more often than not threatened the authorial status of the original creator. One of the best known historical examples centers on the Florentine Renaissance hero, Filippo Brunelleschi and his eternal rival in the construction of the Duomo in Florence, Ghiberti. This is one of the best illustration of the precarious status of architectural design copyright at the very beginning of the age of architectural notation. During the building time of the dome, more than once, Brunelleschi was in danger of being removed from his role as master of the site and author of the cathedral. Once Ghiberti (Brunelleschi's rival in the architectural contest that preceded the commission for the building of the dome) was able to convince the committee representing the Wooler's Guild, that he can finish the construction without the original author. The care with which Brunelleschi was guarding his techniques and innovations as well as errors and shortcomings in the architectural

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notation kept on site, introduced intentionally by the master, led to the failure of the architect rival's attempt to usurp his authority and the right to be considered the father of the first major achievement of the Renaissance architecture [1].

The first major step in the unbinding of the architect from the architectural object, the physical result of his efforts, also happened in the Renaissance. Another master architect's work, Leon Batista Alberti's *De Re Aedificatoria* (1450) produced the first theoretical stance against the authorial architecture [2] of the time. In his treaty, Alberti was a fervent advocate of the architectural notation, the coding of the architectural design through an established convention, as bi-dimensional drawings on paper. He stated that this was the true result of the architect's work and struggle. This, in Alberti's vision, was the original work of the architect and the only thing needed to translate the creator's vision into built form. The physical building, according to the same theory, was a mere copy, an imprint of the original notation, into space. This architectural notation proposed by Alberti opened extraordinary avenues for the dissemination and conservation of architectural design, simultaneously fulfilling the age-old ambition of the author for extended spatial and temporal recognition. But with the advantages brought on by the encoding of architectural thought and oeuvre on paper, enhanced by their facile reproduction in the age of Guttenberg's print press, also came the thorny question of intellectual property of the design. With no author needed to build the architectural object, use and especially reuse of the architectural notation had to be restricted by law and it soon was. The Statute of Anne and Statute of Monopolies [3] were among the first laws passed by the British Parliament dedicated to the protection of intellectual property. The architectural intellectual property is still a matter of legal debate with too little legal protection in many states around the globe.

Fast forward five centuries to the first real application of the digital notation in architectural design, we find the next big change in architectural authorship waiting to happen. SketchPad [4], the first digital system to use the artificial intelligence of the computer as an aid for added meaning and possibilities in architectural design, happened in 1963 as a result of the work carried on at MIT by the pioneer and visionary, Ivan Sutherland. Since then, the digital way of encoding architecture has steadily advanced to become the only *modus operandi* for the architectural profession. The new way of expressing design, meant a further enhancement of all the advantages granted by the use of reproducible architectural notation in the first place, and also of the drawbacks.

2. Contemporary digital authorship .

The new digital design, in all its forms, was easier to understand (thanks to enhanced visualizations not only 2d but also 3d and even 4d lately), easier to use (no genetic predisposition towards drawing, or special drawing skills were necessary), easier to store and keep (no cumbersome physical documents were needed, and virtually no decay of the storage medium), easier to share (the lack of a physical support mean the lack of physical boundaries for the design) and greatly facilitated collaboration (simultaneous and rapid sequential work on the design was possible regardless of physical or even geographical boundaries). The flipside of course to all these wonderful new possibilities was the dilution of architectural authorship and the increased expenditure (both energetic and financial) necessary for the design's protection.

Authorship was diluted, because a lot more people now had the possibility to get involved in the development of the design and thus contribute to the end-result. The gradual rise in complexity of the demands from the architectural product, meant that teams rather than individuals were needed for successful production of good architecture. Also expertise from various fields was outsourced or

even integrated in the design team to ensure a good coverage of all the different aspects involved in the production of contemporary architecture. In the days of analog design, and to some extent even in the early digitally represented design, the architect was the designer at the center of the process and was responsible for understanding and introducing the relevant information in the design notation. This was happening because all the additive intelligence had to be gathered, organized and combined before the notation of the design (on paper or other medium) happened. In this particular way of organizing the design endeavor, a clear path can be traced from the product to the author regardless of the non-architectural information required for the production of the final architectural work.

The new mutability of the digital notation had a deep influence on architectural authorship through changes at many stages along the design production process. For the scope of this paper we are interested in categorizing these changes in pre-architectural, architectural and post-architectural.

The **post-architectural phase** gathers everything that happens with the design after it is outside the control of the architect-designer. Usually here we find all the normalization changes needed for the physical production/building of the architectural artifact. These usually do not impact major aspects of the design and therefore can be considered to have low to insignificant influence on authorship. Of more interest in this category are the changes to the design that happen through actual use of the design (in its physical form) or through programmed interaction of the design (in its digital form) with potential users. Two good and very different examples for this are Bernard Cache's famous Table Series and Aedas designed Abu Dhabi Investment Council Headquarters Towers. These are more than designs, they are systems of interaction created to involve the users and deliberately share the burden of authorship for a common architectural performance goal.

The **architectural phase**, although using a strict name, does not refer to design changes initiated by the author architect. It refers to changes made during the period when the design process directly involves the architectural author. As the design bounces back and forth inside a creative team (sometimes spread over two or three continents) changes are inherent and they are not always implemented or even initiated by the author. Sometimes changes occur as a result of ongoing research by design and the de-facto author/architect has little to no control over the outcome of the final form because this implies parts that have yet to be defined by other parties involved. Examples here are abundant and they range from the most mundane cooperation between an architect and an engineer inside a BIM Package, to full scale intercontinental cooperation of tens of entities for the development of certain large scale projects.

The **pre-architectural phase** is of most interest to our endeavor because it is located at the very beginning of the creation process. This is the part where the inception of architectural form starts and also where the first ties are created between the author and its work. In all the declinations of the traditional analog, or even in the direct authorial process, this phase does not exist. This is true because no creative work could traditionally happen before the primal spark of the idea. From there, the research, the struggle the connections and collaborations were all in service of that spark, that more often than not came accompanied by a proto-form. The almighty architectural sketch (part of the countless best practice scenarios and recipes in architecture) is the best proof for this affirmation. In other words, in the traditional creation process, before the first idea, one cannot say that any agent or facilitator of the architectural process will have a say about the direction of the architectural form other than the author himself. Of course there is the discussion about the design brief and whether it is part or not of the design process and if it can be considered a pre-authorial interference in the design. But if we are to analyze authorship strictly looking at the creation process, and considering the author the originator of architectural form and his or hers tools the

facilitators of the design, then we need to make a clear distinction between the traditional, mute and neutral tools of the analog times and the intelligent ones belonging to the architectural contemporaneity.

The digital intelligent tools of today incorporate prepackaged wisdom that unlike the simple tools of our analog past facilitate, but inevitably also suggest the path for the design. This is what can be called the pre-architectural phase, the creation of the intelligent architectural tool one capable of extending the reach of the human mind but also constraining its ability for picking its own creative direction.

3. Types of a priori creation in the digital architectural workflow.

The neutral tools of the past (the like of pencil and paper) could be considered limiting and constrictive only by factoring in the limited ability for design imbued in the human intellect. By contrast, the digital tools of the XXI century, although powerful and facilitating (for the designer) each came with its own particular brand of pre-design wisdom.

The first CAD tools provided only basic functionality, forcing a similar use to the pen and paper, creation wise, but with the added bonus of speed, infinite change, and infinite distributivity. In exchange the designer only had to conform a few designing habits to the change of the medium. Since the tools had little if no extra added functionality other than drawing basic shapes in two dimensions, we can hardly talk of any embedded creativity other than the author's own. This was apparent in the early results of 2d CAD design that had to be combined with hand drawing for the full expression of the design.

The next wave of digital tools that were already harnessing the advanced mathematics of differential calculus [5] brought on the use of complex shapes and especially curvilinear forms previously beyond the reach of the bare human intellect. Such advanced mathematical notions, to be made available to the designer and put to practical use in architecture, had to be packaged behind an interface. This veil, facilitated both simple interaction with complex concepts but also obscured big parts of their general application. In other words by using the tools designers were forced into restricting their avenues of creation in a similar feat to their own design decisions down the line. This coupled with the software-engineers previous decisions of what features (from the universal power of mathematics) to develop, meant exactly the sharing of the original architectural authorship – this time a forceful one. The only problem, from a product diversity point of view, was that almost all CAD solutions came from a handful of software companies and all the tools provided more or less the same functionality. So the shared authorship meant here also a shared predilection towards a formal outcome, the one most easily obtained by using the tool in the prescribed way. This was the blob era of the 1990s and early 2000s.

This trend of facilitating design advancement towards higher complexity, through giving up possible avenues of choice (by using encapsulated pre-authored solutions) and thus sharing authorship, is still strong and affecting the majority of the architectural industry even today. The latest and greatest development in this direction is BIM. BIM is not a program nor is it a current of thought. BIM is a standard and as the name implies in order to attain the set goal, conformity with the norms is a must.

Robert Aish [6] in his seminal text published in *Inside Smartgeometry* and entitled “First Build Your Tools” makes a compelling point explaining the shortcomings of BIM (building information

model). In BIM, he writes, it is very easy to achieve the obvious result the tools were built for, but very hard to make any innovations and deviate from the projected use inscribed in the instrument's code by its makers.

The most characteristic pre-architectural authorship of design though, can be found in a relatively recent development of contemporary architecture, **computational design**. Also known as algorithmic or parametric design, this way of thinking in architecture can be directly linked to systems theory[7] and developments in philosophy[8], and other sciences besides the obvious direct delineation towards the digital informational revolution in full effect already in the first decades of the XXIst century. As Robert Aish states in the same text, computational design creates a critical distinction between the generative description of a building (through a script or a graph[9]) and the visual or textual description of the result, the final form. This becomes a critical disjunction between design as static form and design as a process with multiple outcomes, the design that builds potential versus the design that builds form. This dialectic has deeper and older roots and can be found under different names like in Deleuze and Cache's objectile[10] versus object and also Kolarevic's geometry versus topology [11].

From a philosophical point of view of special interest is Caches's notion of the objectile. The post-structuralist term coined by Bernard Cache together with philosopher Gilles Deleuze can be considered both a mental spark and a metaphysical final destination for architectural authorship and digital techniques. The objectile as described by Cache and Deleuze is the technically indeterminate and immaterial object that, through its description, embodies a family of similar but still different entities. These entities, just like the productions of an architectural algorithm, are tied together by the constants specified in the objectile's descriptions but also separated by its indeterminacy that takes different forms in each of its instances. From a mathematical point of view if this family of objects can be reduced to points in a graph then the objectile would be the mathematical function connecting and describing each of those points.

Keeping with the mathematical connection the distinction between geometry and topology is also a very good analogy to the dialectic between design potential and the produced form. Topology studies the properties of space that are preserved under continuous deformations like stretching or bending. As such for any topologically defined set of rules and infinity of geometrical object can be produced that correspond to those rules. This analogy is used by Branko Kolarevic when describing the shift towards multi-dimensionality in design in the digital algorithm era. Designing with the new tools of the architectural trade, produces creations with the added dimensions provided by delayed or transferred choice. Just like devising a topologically defined shape and reserving the privilege to choose later the most appropriate geometry, now the designer can produce the algorithm and reserve or transfer the right of choosing the best form for a later time or to a different entity like the user of client.

Important from our point of view is the fact that design as an architectural process, can now be viewed as two distinct but interconnected parts. The first part is building the design potential, our pre-architectural phase, and it involves building, setting up or adapting the tools for the design. Aside from the well established CAD and BIM framework, this involves coding up custom tools that offer the extended reach of the traditional digital establishment but sans the added restrictions. The second part is using those tools to create, or in a more appropriate term "to find the form". This translates into the second design phase we enumerated earlier in this text the architectural phase. Although distinct and some of the time performed by separated professions (architect vs coder) the two phases are intimately interconnected. Looking at the already established authorial workflows in computational design, we can distinguish that tool building and tool using determine each other in

an iterative feedback loop. Most of the time the instrument evolves alongside the design in a sort of a reciprocal conditional relationship.

4. Different types of instrumental aid in computational design and different types of shared authorship.

As it is already visible from the text so far, our main point in this paper is gathering attention and interest towards a new category of architectural profession, the tools builder. Its rising importance in the overall design workflow, needs to be evaluated in the context imposed by the implacable march of the architectural design process towards pure digital information. The new ways of designing brought on by society's more complex needs have to be catered to, by a larger and more heterogeneous combination of professions. Out of those many professions, if it is to remain relevant, architecture needs to do more than stand out as a mixture of art and science. It needs to adapt and allow for new meaning and abilities to be added right at its core understanding. It needs to be able to take charge again by mastering the common language of informational exchange and formal, functional and structural complexity. For that, the digital smart tools of the present look like the only opportunity. The tools that can make a difference for architectural authorship are the polymorphic instruments built by practitioners of architectural design or by third parties but through uninterrupted and bidirectional feedback with architectural practitioners. One of the declinations for such tools is the script.

In his book *Scripting Cultures*, Mark Bury talks about three different types of scripting and their place in the form creating architectural flux. Scripting for productivity, scripting to find the otherwise unreachable answer and scripting for tapping into the unknown or scripting for speculation. Each brings a particular brand of partial replacement for the original, traditional architectural authorship.

Scripting for productivity the first kind Bury mentions, uses the specially conceived tools to enhance the productivity of the traditional design tasks the architect does during the creation process. As a result the architect can do faster more designing. The temporal shrinkage of the creation cycle benefits both the architectural establishment and the clients. As design gets represented and fabricated quicker (and possibly cheaper) architect get more time to design and clients less time spent for the design process. In this particular installment, scripting (if not done by the author) replaces authorship in the latter phase of the process often regarded as irrelevant by the architects. Still losing control over an important part of the process can't be desirable as most of the time a lot of the changes that happen downstream reflects back on the solution.

Another type of **scripting**, the one used as an instrument **to find the answer**, can be considered a true extension of the creative intellect. The use of the word extension here is deliberate, because it proposes a relevant illustration of the process of creation augmented by the smart digital tools. Here the customly created, intelligent tool, facilitates a result otherwise unattainable, although imaginable, by the designer or design team. Just like something one can see (or at least imagine) but can't reach without the proper tool. Again if paternity of the tool does not fall with the architectural designer, a big part of the otherwise claimed authorship is lost. In this process all the designer knows are the starting and end point of the design (some times the end point can be rather fuzzy). All that lies in between is fashioned by the tool. Leaving aside the big impact the process can have in the nuance of the result (even if it is a known one) no one can argue that authorship is split between envisioning something and making it happen. This process, although analogies can be

traced, can not be compared with designing versus building at another scale. With this kind of scripting, endpoint of the process can be a desire, a requirement that needs to be met, something devoid of any form or image. Keeping this in mind we realize that setting the bar for the performance of the design is not making the design itself. How well a design performs or achieves something can have little impact in the overall definition of the designed product. But if that criteria can't be met in any other way than surrendering the process to some instruments with unknown innards and motivation, then we can safely say that with that a big part of the paternity over the design is surrendered too.

Last but not by any means least, in our quest for determining architectural authorship in the contemporary digital world of design, we should look at **scripting for looking into the unknown**. Design exploration, or design speculation, is not an exclusive trait of digitally powered architecture. Form finding was used from Renaissance times both as means to an end and as a search apparatus into new and unexplored territories of design. Even before the advent of computers, pioneers like Antoni Gaudi, Otto Frei or Heinz Isler, used physical computing systems to find ways towards performance through form and often as an added bonus found recipes for design and shapes no one anticipated.

In digital design, the somewhat restricted ways of physical form finding were exchanged for the virtual, limitless possibilities of the digital medium. The wide application of the scripting tools in digital morphogenesis allows now for a direct transference of the creative thought process into the artificial mind of the computer. The benefits for this are quite a few (like the ability to tackle complex systems in search for form, produce design through time based interactions, simultaneously use countless sources and amounts of information etc) but are beyond the scope of this text. What matters here is not the reason for this transference but the process itself. The very inception of the creative design endeavor being sparked inside of the instrument rather than inside the creative human mind, means a total surrender of any real authorial claim over the design result. The architect, if just an ignorant operator of the tool, thus effectively relinquishes all real control over the outcome and with it, all ties to meaningful authorship of architecture.

5. Conclusion

The three categories listed above are all theoretical, and real digital design will never rely on one single type of scripting. This is especially true for the last category that represents a relatively new addition to the digital avant-garde one that has yet to produce real meaningful design by itself. All that being said what emerges from the enumeration, is that no matter what kind of intelligent digital aid the designer employs to keep his or hers design relevant for the contemporary world, a transfer of control and authorial ownership is being made towards a third party, the tool builder. This is a fact and the profession needs to be aware, that the meaning of the word architect starts to slowly dilute away under the influence of the very tools it employed to conserve its relevance. Architects need to become successful tool builders, because otherwise they will slowly transform from producers of design into users of design. This is true because the instrument design seems to be more and more a legitimate part of architectural design. The tendency to transfer expertise and knowledge (inside the architectural design process) from using the tools of the trade to building the tools of the trade is the only logical action in the new context of the simplified interaction trend that digital revolution is bringing to all tools and consumer goods alike.

For this, coding (program or script code writing) will soon become an essential skill and not only a cool superpower that some architect have. Architecture schools especially need to take notice of

that and move away from the CAD user philosophy currently being instilled into young architect minds. Instead students and architects alike should strive to acquire, besides the computer language skills, also the algorithmic problem solving and inquisitive mentality that would allow them to bend the power of the machine to their creative will.

6. References

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